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ABSTRACT

To determine the impact of Summer Institutes on the professional activities and competence of the participants, a questionnaire was sent to 5,452 participants of 1970 Summer Institutes approximately 16 months after they had returned to their classrooms. Completed questionnaires were returned by 4,476 participants. Several demographic characteristics of participants were obtained, and detailed analyses are provided for many of these characteristics. More than two-thirds of the respondents stated that new curriculum materials had been implemented in their classroom, either in whole or in part. Approximately one-third of the participants reported that a change in assignment or status had occurred because of their institute attendance. The participants perceived that inservice education would best serve to bring about classroom improvement. Included in the report and its appendices are discussions of the extent of constructive action taken in the classroom, as well as feelings of professional growth resulting from institute attendance; the actual subjects taught and teaching loads are also presented. Previous participantion in NSF institutes is analyzed in detail by age, sex, and extent of previous institute experience. Numerous tables and eight appendixes are included. (For related documents, see TM 002 380, 381.) (DB)

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EVALUATION OF 1970 SUMMER INSTITUTES FOR SECONDARY SCHOOL TEACHERS OF SCIENCES AND MATHEMATICS PROGRAMS

Prepared for
National Science Foundation
Contract NSF-C677

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ABSTRACT

The National Science Foundation supported an effort to evaluate the 1970 Summer Institutes for secondary school teachers of science and mathematics. Under contract to the Foundation, the Center for Educational Research and Services, College of Education, University of Toledo, conducted a study to determine the impact of Summer Institutes on the professional activities and competence of the participants which focused on: (1) the changes in teaching practices, new assigned duties and evidence of professional growth that could be directly attributed to attendance at a 1970 Summer Institute, (2) an inventory of educational needs as perceived by classroom teachers and supervisors for different disciplines, (3) the extent to which the participants' Summer Institute experiences met their perceived educational needs, (4) a comparison of the rankings of the 1970 Summer Institute objectives by institute directors with rankings by their participants, and (5) a record of the extent new curriculum projects were implemented into schools by the participants.

The 1970 Summer Institutes were divided into two groups. A Census group was composed of institutes possessing special features, which made it desirable to obtain information from each participant. A remaining group was then composed of institutes from which information was desired from a random sample of ten per cent of the participants. The designation of institutes in each of the two groups was provided by the Foundation.

The questionnaire, developed jointly by the project staff and NSF personnel, was sent to 5,452 participants of 1970 Summer Institutes approximately sixteen months after they had returned to their classrooms. This period of time allowed each participant one full school year and the

beginning of a second academic year after attending the Summer Institute to allow the influence of the Summer Institute experience to help bring changes within his school or classroom. Completed questionnaires were returned by 4,476 participants for a return rate of 82 per cent. This was a very high rate of return for an extensive survey employing a long (five page) questionnaire, and seemed to reflect the participant's continuing identification with a favorable attitude toward the Summer Institute program.

Teacher Characteristics. Several demographic characteristics of participants were obtained and detailed analyses are provided for many of these characteristics. Some of the results are summarized below.

The age-sex distributions for Institute subgroups showed marked differences in representation of males and females in various age categories. For example, in Mathematics institutes there was a decided peak in numbers of 30 to 39 year old males, but females in this age group showed the lowest number of participants. A markedly different trend was found in the 30 to 39 age group for Science participants. In both discipline areas the over 30 age groups showed the highest ratios of female to male participants.

A comparison of age-sex data obtained by this study with data obtained by the Foundation in 1968-69 on a sample of all mathematics and science teachers in the country revealed general contrasts between the two sets of age-sex distributions by discipline. Among many other observations, it was noted that over 50 per cent of the mathematics teachers in the United States were under 30 years of age, while only 40 per cent of the participants in the 1970 Summer Institutes were under 30. Relatively more Institute participants fell into the 30 to 3[illegible] age group than occurred in the teacher population.

A comparison of 1970 teaching assignment distributions showed that senior high school teachers attended Sequential institutes more than Unitary institutes, with the reverse trend for junior high school teachers. The same trend was exhibited for institute levels (indicating educational qualifications required for attendance); senior high school teachers attended more advanced institutes than junior high teachers.

Implementing New Course Materials. About 10 per cent of the 1970 Summer Institutes could be described as "Implementation Institutes." They were primarily devoted to helping teachers implement a specific new curriculum into their classrooms and schools. All of these institutes were included in the Census group, and a special section was added to the questionnaire for these participants designed to elicit the extent of actual implementation. More than two thirds of the respondents stated that the new curriculum materials had been put to use in their classrooms either in whole or in part (many curriculum projects are designed for incorporation of units into an existing course, as well as for replacement of an entire course.) About one third of the participants attended these institutes to help them decide whether they should adopt the new curriculum and a similar proportion attended because they were already committed to teaching it.

Changes in Assignment or Status. Approximately one third of the participants reported that a change in assignment or status had occurred because of their institute attendance. In general, those who had attended implementation institutes had more changes in their professional duties and status than participants who attended non-implementation institutes. Twenty-two per cent of the implementation institute participants reported that they were involved with inservice training of other teachers, while 10 per cent

of the non-implementation sample reported inservice training involvement. Participants from both the implementation group (30 per cent) and the non-implementation group (23 per cent) were active in curriculum development in their schools that was directly attributable to their 1970 Summer Institute attendance. About 75 per cent of all the participants listed at least one significant change in their status or teaching assignment attributable to Institute attendance.

Educational Needs for Classroom Improvement. The 1970 Summer Institute participants perceived that inservice education would best serve to bring about classroom improvement. However, what they thought this inservice education should entail varied with the kind of Institute they attended. The non-implementation group stressed most the needs of updating teachers' subject matter backgrounds and in depth teacher education. They reported that their Summer Institutes satisfied these needs best, along with providing teacher refresher training. Student learning needs which included helping the able student, individualizing instruction, adopting inductive methods of teaching, and getting students actively involved in the learning process were also ranked high. Their institutes did help with the able learner, but less so with other student based needs. The implementation institute participants rated the student based needs as most important, and reported a higher attainment of needs met. Group variations are numerous for different items along the disciplines.

Additional Results. Among the many kinds of data and comparisons presented in the text and appendices are reports on the extent of constructive action taken in the classroom as well as feelings of professional growth resulting from institute attendance. The actual subjects taught and

teaching loads, according to discipline of the institute attended, are also presented. Considerable variations in teaching loads existed within institute types and disciplines.

Previous participation in Foundation institutes is analyzed in detail, by age, sex, and extent of previous institute experience. Marked differences were shown between the sexes in ages and rates of attendance. Discipline differences in attendance were also notable. For example, 68 per cent of the Social Science participants were attending Foundation institutes for the first time, and over 30 per cent of the Mathematics and Science participants were also first time attendees. First time attendance was over 40 per cent for junior high school teachers of General Science institutes. However, over 30 per cent of the Chemistry institute participants were classed as having had a heavy pattern of previous institute participation while only 15 per cent of the Mathematics institute participants were heavy attendees. Well over 40 per cent of the participants in two of the implementation projects, Harvard Project Physics and Engineering Concepts Curriculum Project, were heavy attendees.

The analyses, determined cooperatively by the National Science Foundation and the project staff, combined the data and contrasted separate institute types in a manner which maximized the useful information needed for National Science Foundation policy decisions. The organization of data was designed to show the effects of various kinds of Summer Institutes that were offered in 1970 through an indepth examination of participant information.

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The project director is grateful to Dr. Hausman for his professional guidance throughout the study. Dr. Hausman actively assisted the project staff in the development of an extensive data bank regarding the effects of 1970 Summer Institutes on their participants' subsequent teaching positions. The director is also grateful to Dr. William Morrell, Miss Jane Stutsman, and Mrs. Phyllis Johnson for their assistance on specific issues relating to the project.

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CHAPTER I

PROJECT OVERVIEW

The National Science Foundation (NSF) has supported its Summer Institute (SI) program for secondary school teachers for nearly two decades. From a very modest beginning of one institute held at the University of Washington in 1954 with a total expenditure of $10,000, the SI program has expanded into a multimillion dollar operation. Most of the institutes have been devoted to natural sciences and/or mathematics, but a relatively small number of institutes in social sciences have been included since 1961.

It is not the purpose of this study to review the history, content, or operation of the SI program.[1] However, some brief comments are in order relative to the general orientation and objectives of the program. As a very general observation, the SIs might be characterized as an exceedingly varied group from several perspectives. Each SI is an individualized operation, with the director having a great deal of freedom within general NSF guidelines. There is no standardized list of prerequisites or requirements, no common procedure for granting credits, and no single difficulty level for institute content. Each institute focuses on targets which it chooses; different institutes are targeted toward different needs. Whatever the specific needs of an individual teacher or whatever his position in the secondary educational structure, the assortment of institutes is likely to include at least one that is directed toward needs which he considers

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[1]For a detailed account of the SI program and its history, the reader is referred to: Kreighbaum H., and Rawson, H., An Investment In Knowledge, New York, New York University Press, 1969. Several of the comments in this section are based on information from this publication.

important. Summer Institutes can be classified in a number of ways. Those in which participants study for a single summer are called "Unitary"; those designed primarily to offer a coordinated sequence of summers in which qualified participants return to successive institutes are classed as "Sequential." Some institutes are exclusively for senior high teachers, others for junior high teachers, and still others combine the two types of teachers. Some institutes concentrate on a single discipline such as Chemistry and others focus on combinations of disciplines such as General Science or Multiple Fields.

With all this diversity, there are still some common characteristics inherent within the SI program. Key emphasis of all institutes has been on improving the teaching of science (broadly defined, including mathematics and the social sciences). The institutes stress subject matter; that is, fundamentals in the discipline are stressed rather than pedagogy. NSF officials have generally held the view that typical graduate and undergraduate science courses emphasize content slanted toward research rather than teaching-oriented careers. Thus, one of the underlying objectives of the SI program is the inclusion of content specially designed to aid teachers in teaching their courses.

The SI program, as presently conducted, serves the participants in the following four major ways. These may be considered a direct reflection of the general goals of the program. They are not necessarily distinct or independent objectives and it should not be inferred that all or even any given institute is necessarily designed to incorporate all of the objectives.

1. Updating: SIs offer refresher courses for teachers who were once well prepared, but who for some reason have not kept up with new knowledge in the field.

2. Upgrading: SIs provide basic training for teachers who were not well prepared in the first place. Many teachers teach in two or more areas but have concentrated training in only one, and some have had very little training in any science subjects taught.

3. Reorienting: SIs offer training in teaching new curricula and different courses for teachers who are qualified to teach traditional courses. Certain institutes, the implementation institutes, are oriented toward course content improvement programs.

4. Advanced Training: SIs provide training in science subject matter.

In supporting a complex enterprise such as the SI program with its broad scope, multiple purposes and diversity of content, the NSF has been concerned with the effects of institute attendance upon the participant and his subsequent professional performance. These concerns were substantiated with a request for proposals (RFP) to evaluate the 1970 Summer Institutes.[2] On July 15, 1971, NSF awarded a twelve month contract for the Evaluation of Summer Institutes for Secondary School Teachers of Science and Mathematics to the Center for Educational Research and Services at the University of Toledo. This is the final report of that study to the National Science Foundation.

Project Design

During the summer of 1970 there were 445 NSF-supported SIs for secondary school teachers with approximately 19,000 participants attending. A follow-up study was conducted in which selected participants were asked to respond to a questionnaire 13 to 16 months after they had returned to their classrooms. This permitted each participant one full school year and the beginning of a

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[2]RFP No. 71-130, Evaluation of Summer Institutes for Secondary School Teachers of Sciences and Mathematics Programs, National Science Foundation April 9, 1971.

second academic year after attending the Institute to implement change within the school and/or classroom.

The purpose of the follow-up study was to evaluate the effects institute attendance had upon the participants and their subsequent professional performance in the classroom. Additional objectives included a desire to obtain an inventory of educational needs as perceived by classroom teachers and an attempt to determine the extent to which the participants' institute experiences matched their perceived educational needs.

Because of the large number of participants, limited time and many other constraints on a follow-up study, procedures had to be employed for efficient questionnaire administration to a sampling of the 19,000 participants. Based on the type of institute attended, the total population of participants was divided into two groups. One group was composed of participants who had attended institutes from whom information was desired from each participant because of the special features of these institutes. This group was called the Census and represented 93 institutes and 3,694 participants. The second group was composed of participants who had attended institutes from whom information was desired from only a random sample of ten per cent of the participants. This second group was called the Sample, representing 338 institutes and 15,176 participants. There were 1,758 participants selected to receive questionnaires in the Sample, for reasons which are discussed in Chapter II. Participants from each group were sent a questionnaire which was designed and developed by the project staff and NSF representatives.

Questionnaire Development

Questionnaire items were prepared by the project staff and reviewed by NSF staff to ensure that the type of information requested from the participants would accurately reflect the needs of the Foundation.

The development and revision of the questionnaire were the most urgent and extensive tasks for the first three months of the project. Two tryouts of the questionnaire were administered by members of the project staff in 1971 Summer Institutes: one at Western Michigan University with 170 participants in three NSF Institutes and the other at Ohio State University with 106 participants in two NSF Institutes. Results of these tryouts were used by the project staff for subsequent revisions of the questionnaire. A final version of the questionnaire was field tested again with 1971 Summer Institute participants at Drake University and The University of Iowa. These last tryouts were to check specifically on the wording of the directions and the general format of the questionnaire. Throughout this three month period, several joint sessions of the project staff and NSF personnel were held for purposes of questionnaire development and detailed project planning. The final version of the questionnaire was approved by NSF, cleared through the Office of Management and Budget in accordance with federal regulations and assigned the number OMB No. 990S71004 with the approval for use expiring July 31, 1972.

Final Version of the Questionnaire

Since a portion of the Census SIs was designated by NSF as having special curriculum characteristics, Section VII of the questionnaire was designed especially for these participants. Appendix A contains a copy of the questionnaire sent to the participants in institutes having special

curriculum characteristics. All other participants received an identical questionnaire except that Section VII was omitted.

Directions in the questionnaire differed from section to section and participants were reminded to read each set of instructions carefully. The numbers in parentheses on the left side of each page of the questionnaire were for coding purposes and the participants were instructed to disregard them while they responded to the items.

Section I was devoted to demographic data which was used during the analysis for a background description of sub-groups of the Census and Sample. Although data on a few items collected in Section I of the questionnaire could have been obtained from separate records available at NSF, for the sake of efficiency all the necessary descriptive information was collected in one compact section for subsequent computer analyses. This included much additional background data available from no other source.

Section II was concerned with the participants' previous attendance at NSF-supported programs. Its purpose was to focus attention on the background differences between participants in the 1970 Summer Institutes with no previous institute experience and those participants who had attended institutes in earlier years. Three categories of respondents were identified: (1) participants with no previous institute attendance, (2) participants who had attended an Academic Year Institute or more than two previous Summer Institutes, and (3) participants with all other patterns of previous institute attendance. The profiles of these three groups were analyzed for similarities and differences by using the demographic data in Section I for the comparisons.

Section III contained items related to determining the effect of the 1970 Summer Institute in increasing the professional competence of individual

teachers. Items were designed to reflect changes which might have occurred in a participant's professional duties and status that were judged to be directly attributable to his participation in the 1970 Institute. If the participant had attended other institutes prior to 1970, his responses were to reflect the cumulative effect of all institutes attended through the summer of 1970.

Section IV contained a list of generally recognized educational needs suggested by the Foundation and the project staff as applicable particularly to secondary school teachers of science and mathematics. For the twenty-three recognized educational needs listed, the participants were asked to respond in four ways: (1) to designate those needs they believed were particularly important to them as teachers, (2) to indicate those needs they had expected would be dealt with in the 1970 Summer Institutes, (3) to assess which needs the 1970 Summer Institute had actually helped them to meet, and (4) for those who had attended institutes prior to the summer of 1970, to designate which needs their total institute experience had helped them to meet.

In Section V the participant was asked to indicate the extent to which the 1970 Summer Institute had contributed to potential changes in his teaching pattern. Twenty-six items were listed, each rated on a five point Likert-type scale, reflecting growth in professional competence of the individual as distinguished from meeting the perceived needs of his school. The items were of two types: those primarily concerned with attitudes or feelings of increased competence, and those describing specific actions which a teacher might take as a result of a training program. Total scores were then separately derived from the sum of responses to each class of items, labeled "feeling tone" and "action." Average response scores for sub-groups of participants were then compared.

Section VI contained a set of objectives established by NSF for the 1970 Summer Institutes. Each of the 1970 Directors ranked these objectives in their order of importance, first from the viewpoint of their original intentions and second as they interpreted the actual outcomes of the institute. These rankings were made available to the project staff from NSF records. The participants were asked to rank the same set of objectives that their Institute Directors had ranked in 1970, so that a comparison could be made between participants' and Directors' perceptions of the objectives of their mutual institutes.

Section VII was sent only to participants who attended an institute oriented toward one of the new curriculum projects developed with the assistance of NSF support, as designated by the NSF staff. These items were designed especially to elicit the degree of implementation of the new curriculum projects in secondary schools.

Space was provided in the questionnaire for participants to place additional comments that would be beneficial to NSF personnel in planning future institutes. The request for additional remarks from the participants was not a part of the contract with NSF, therefore no attempt was made to summarize or analyze the responses for this report. It was estimated that about thirty per cent of the completed questionnaires contained additional comments.

Overview of the Project Tasks

The primary responsibilities and task involvement of the project staff are outlined in Figure 1. The major tasks are listed in order of their number of weeks into the project. Figure 1 basically summarizes the overall tasks of the project staff and how each member of the project

staff (excluding the secretary) was related to these tasks. Some staff members had primary responsibility for certain tasks, while others were only involved in the tasks to the extent their specialities were needed.

R Primary Responsibility for Task
I Involvement in Task

Project Task	Weeks* in Progress	Project Director	Data Analyst and Sample Designers (2)	Science Specialist	Mathematics Specialist	Graduate Assistant	Computer Specialist
Preliminary Questionnaire Developed	1-3	R	I	I	I	I	
Definition of Background & Demographic Data	1-4	R	R	I	I	I	I
Revision & Development of Final Draft of Questionnaire	4-5	R	I	I	I	I	
Sample Selection	6-9	R	R	I	I	I	I
Progress Report Preparation	8-9	R				I	
Transfer of Data from Participant Information Sheet to IBM Cards	9-14	R	I			I	I
Initial Release of Questionnaire	12	R	I	I	I	I	
First Follow-up of Questionnaire	15	R	I	I	I	I	
Progress Report Preparation	16-17	R				I	
Second Follow-up of Questionnaire	17	R	I	I	I	I	
Third Follow-up of Questionnaire	18	R	I	I	I	I	
Data Transfer from Questionnaires to IBM Cards	20-28	R	I	I	I	I	I
Progress Report Preparation	27-28	R				I	
Computer Analysis	29-34	R	R	I	I	I	I
Data Analysis	35-42	R	R	I	I	I	I
Progress Report Preparation	37-38	R				I	
Final Report Preparation (1st stage)	43-46	R	I	I	I	I	
Progress Report Preparation	45-46	R				I	
Final Report Preparation (2nd stage)	46-52	R	I	I	I	I	

*Week number of the project, e.g., the first task was in progress the 1st through the 3rd weeks inclusive.

Figure 1. Project Staff Responsibilities

CHAPTER II

SELECTION OF POTENTIAL RESPONDENTS

This chapter describes how the potential respondents were selected according to characteristics of the 1970 Summer Institute attended. The institute participants were separated into two major groups: (1) a Census group in which all participants were sent questionnaires, and (2) a Sample group, in which a sample of approximately ten per cent of the participants were sent questionnaires. For this latter group a description of the sampling plan is provided. A sequence of the questionnaire mailing and follow-up notices is also given. Finally, a description of the response patterns by various institute characteristics is provided. In addition to the separation of Census and Sample groups, the major characteristics considered were Unitary vs. Sequential institutes and Level A vs. Level B institutes. The levels of the institutes refer to the prerequisite academic backgrounds of participants selected for attendance. For the purpose of this study, Level A institutes were for partici pants having a minor or less in the subject area studied and Level B institutes were for participants with at least a major in the subject area. The reader is referred to Appendix B for more details on the operational definition for designating institute level.

Designation of Census and Sample Groups

For the purposes of this study, NSF separated all 1970 SIs into two groups. One group of ninty-three institutes contained 3,694 participants and comprised the Census group of the study. The final designation of the institutes included in the Census was provided by NSF. The Census group included the following institutes:

1. All implementation institutes for NSF-supported course content projects, whose written materials have been commercially available less than three years (except for Engineering Concepts Curriculum Project - ECCP - which expected publication during the year 1970-71)

2. All Social Science institutes

3. All institutes directed at supervisors

4. Institutes directed primarily at junior high school science teachers.

The first three types of institutes listed were clearly different in content than the more common content oriented science and mathematics institutes. The first dealt specifically with implementation of new courses in schools. The second dealt with social science content and was a relative newcomer to the scene with a comparatively small number of institutes. The supervisors institutes were few in number and had a very special emphasis.

The fourth type was included in the Census because NSF has a particular interest in the junior high school science teacher due to the transition that science teaching is undergoing at that level. The content of science at this level has never been conclusively defined, nor are there well established criteria for teacher preparation. The grouping was inexact since teachers could cross the line from junior to senior high, and the institutes were often set up so that some senior high teachers were desired. The group consisted of mostly Earth Science (code: EZ) and General Science (code: GS) institutes. They were selected by the following means. All implementation institutes for IPS, ISCS, and ESCP (three of the NSF-supported course content improvement projects) were included. All Earth Science and General Science Sequential institutes were included. Also included were randomly selected Unitary institutes in the Earth Science and General Science categories. Thus a few in these two broad discipline categories were omitted from the Census and

some were picked up in the Sample population. The latter, those in the Sample, may be viewed as skewed in the direction of being non-implementation and are probably representative only of the non-implementation Unitary institutes.

The participants in the remaining 1970 SIs, those not included in the Census, were to be sampled using a sampling ratio of .10 as requested in the RFP. There were 338 institutes remaining in the population to be sampled from an estimated total of 16,000 participants, or an actual total of 15,176 as determined later. Thus, the estimated sample size was 1,600. It is important to note the distinction between the Census and Sample since not only did one require a random sampling plan, but the distinction has definite implications for analyzing the results. For instance, the Sample was heavily weighted in favor of senior high school science teachers, as well as most junior high and practically all senior high mathematics teachers. It contained relatively few junior high science teachers and practically no social science teachers. There was also a small number of implementation institutes in the Sample but these were for the senior high school NSF-supported curriculum projects developed in the early 1960's.

Sampling Plan

The method of selecting the sample of institute participants of the Sample group who were to receive questionnaires was that of sampling through an intermediate unit.[1] This is basically a two-stage, random sampling

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[1]For a general overview of the procedure see, Wiersma, W. Research Methods in Education: An Introduction, (Philadelphia, J. B. Lippincott, Co., 1960) pp. 268-270. For the reader not interested in the technical aspects of the sampling plan, please advance to p. 15, where the actual application of the plan is discussed.

procedure involving the sampling of an intermediate unit followed by sampling of a primary unit from within the intermediate unit. In this case the intermediate unit was the institute and the participant was the primary unit. The procedure is described here for the interested reader, as it has implications for analysis and the interpretation of results.

A participant's probability of being included in the sample was the product of two probabilities: (1) the probability of his institute being selected (p_1), and (2) the probability of his being selected if his institute was selected (p_2). Institutes were selected with probabilities proportional to size. The selection of the participants (primary units) consisted of the following steps.

1. Determine the number of intermediate units (k) to be included in the sample.

2. Let N equal the number of primary units in the population; and N_i the corresponding value for the ith implementation unit; determine N/K which will be a sampling interval and let N/K = I.

3. List all the intermediate units of the population in some predetermined order (discussed below) and determine the cumulative frequency distribution of the N_i's. Each intermediate unit thus has a number consisting of the sum of its N_i and all preceding N_i's.

4. Select a number (j) at random from numbers 1 through I inclusive. The first intermediate unit is the one in whose cumulative sum j falls. Subsequent intermediate units are selected by determining the numbers j + I, j + 2I, ... , etc. and the units that these numbers "hit" relative to the cumulative sum. When the process has been applied to the entire list, the intermediate units have been selected.

Consider the number of primary units to be selected from the intermediate units. Let n equal the total sample size, in this case estimated to be 1,600 (ten per cent of 16,000), and n_i equal the sample size in the ith intermediate unit. The probability of a primary unit (participant) being selected was $\frac{n}{N} = P_1 \cdot P_2 =$ a constant, in this case .10 according to the procedure discussed above:

$$P_{1i}\ \frac{N_i}{I}=\frac{N_i}{N/k}=\frac{N_i \cdot k}{N}$$

where P_{1i} is the probability of the ith intermediate unit being "hit", that is, probability proportional to size and by definition $P_{2i} = \frac{n_i}{Ni}$. Therefore,

$$\frac{n}{N}=\frac{N_i k}{N} \cdot \frac{n_i}{N_i} = \frac{k \cdot n_i}{N}$$

and since n and k are fixed, n_i is also fixed. The sample size of primary units is the same for all intermediate units, namely n/k. Thus, after the institutes had been selected for the sample an equal number of participants were randomly selected from each selected institute.

Prior to the selection of the institutes for the sample, the population of institutes to be sampled was stratified according to the following three stratifying variables: (1) Sequential or Unitary, (2) Discipline of the institute, (3) Level A or Level B. The advantage of the stratification was that it enhanced proportional representation of the strata in the sample. It also minimized the possibility of relatively small strata being missed entirely.

It was decided that eighty institutes would be selected from the larger population of 338 institutes to be sampled. Eighty institutes required the selection of twenty participants from each institute, a substantial number that would allow for between institute comparisons if desirable. The typical enrollment of an institute was in the 40-50 range. Actually a ten per cent oversample of participants, making a total of twenty-two participants selected from each institute, was included in the sample. The oversample was included in anticipation of some non-response of participants. It was estimated that non-response would likely exceed ten per cent, however, ten per cent seemed

feasible within budgetary constraints, and certainly some non-response could be tolerated. It should be pointed out that oversampling does not change the percentage of response; it simply provides more data. A breakdown of the proportions of institutes in the Sample and in the Population of institutes sampled is provided in Table 2.01, with the NSF code for disciplines provided in parentheses.

TABLE 2.01

Proportions of Institutes in the Population and Sample by Stratifying Variable

	Pop.	Sample		Pop.	Sample
Type			Discipline		
Unitary	.414	.500	(BZ) Biology	.167	.150
			(CH) Chemistry	.089	.075
Seq.	.586	.500	(EN) Engineering (ECCP)	.003	.000
			(EZ) Earth Science	.047	.038
			(GG) Geography	.009	.013
			(GS) General Science	.927	.025
Level			(HI) His & Phil of Science & Math	.006	.000
			(MA) Math	.382	.412
A	.491	.463	(PY) Physics	.068	.061
			(RD) Radiation	.012	.013
B	.509	.537	(XX) Multiple Discipline	.181	.212

An inspection of Table 2.01 reveals that proportions between the Sample and the Population are markedly consistent. Even in the large dichotomous variables, the discrepancy in all cases is less than .09. The largest discrepancy in the discipline strata is .04. Thus it was concluded that the sample was distributed very well proportionally relative to the population from which it was selected.

Schedule of Questionnaire Mailings

The questionnaire development, revision, and printing took place during the summer and early fall of 1971. The initial mailing of the 5,452 questionnaires took place during the week of October 5, 1971. The first follow-up to this mailing, a postcard reminder, was sent the week of October 26. The second follow-up reminder, which included a copy of the questionnaire in the event the first copy had been lost or misplaced, was mailed the week of November 8. The third and final follow-up, a postcard reminder, was mailed to the remaining non-respondents early in the week of November 22. The cutoff point for receiving completed questionnaires was the final mail delivery of December 15, 1971.

Since follow-up reminders and questionnaires crossed in the mail it was impossible to determine exact percentages of returns during each of the mailing periods. However, at the time of the first follow-up approximately 45 per cent of the original 5,452 questionnaires sent had been returned. At the time of mailing the second follow-up the returns were approximately 67 per cent. The final count of returned questionnaires was 4,476 which was 82.10 per cent of the original 5,452 mailed. A chart showing the percentage of questionnaire returns by discipline appears in Appendix C.

Patterns of Respondents and Non-Respondents

Any large survey study involving the mailing of questionnaires inevitably involves some non-response. In the event that there is a substantial percentage of responses, as was the case in this study, non-response does not comprise a serious problem. Nevertheless, in order to ascertain the representativeness of the returned questionnaires, the patterns of non-respondents and respondents relative to institute variables were examined.

Before considering various breakdowns of respondents, a comment concerning "unreachable" participants is in order. The mailing of the questionnaire was approximately fifteen months removed in time from the completion of the 1970 SI. With a large mailing it was expected, for whatever reasons, that not all selected participants would be reached. There were 110 questionnaires returned as undeliverable. This comprised an overall percentage of 2.02 per cent of the participants as unreachable. Of the 110, 46 were in the Sample and 64 in the Census giving percentages of 2.62 per cent and 1.73 per cent unreachable in the Sample and Census respectively. If we consider the remaining 5,342 questionnaire recipients the return of 4,476 represents 83.79 per cent. Considering the Census and Sample separately and basing the returns on 5,342 questionnaire recipients, the rates of return were 85.04 per cent and 81.13 per cent respectively. From this point forward the percentages in this report are based upon the 5,452 participants originally sent questionnaires, since that number of participants, reachable or not, were in the 1970 SI programs.

The real crux of considering patterns of non-response was to determine whether there were certain pockets of non-response that would tend to make the respondents unrepresentative of the original group sent questionnaires. In no way are we implying that respondents comprised a random sample of any original group sent questionnaires. The only use of random sampling in this study was the random sampling of participants for the Sample. The participants selected comprised a random sample of the larger population sampled. Since the Census and the Sample involved markedly different selection methodology, they are discussed separately.

Non-Response in the Census Group

The overall response in the Census was 3,087 questionnaires returned from the mailing of 3,694 for a return rate of 83.57 per cent. The participants in Unitary institutes, who comprised the major portion of the Census, had a return of 83.20 per cent and those in Sequential institutes had a return of 85.00 per cent. The only Sequential institutes in the Census were those in General Science and Earth Science and they consisted primarily of junior high school teachers. Thus, the proportion of non-response was slightly higher in Unitary institutes, being .168 as compared to .150 for Sequential institutes.

Considering Levels A and B in the Census there were 16.04 per cent and 17.60 per cent non-response respectively. Considering the type of institute and level in a four-way breakdown, the proportions of non-response were as follows:

	A	B
Unitary	.163	.184
Sequential	.148	.165

An inspection of the breakdown does not indicate any substantial interaction between type of institute and level. The Level A-Sequential combination had the lowest rate of non-response, and the dichotomies for Level A and Sequential had the lowest rates. A summary of numbers of questionnaires sent and returned for the Census is presented in Table 2.02.

TABLE 2.02

Numbers of Questionnaires Sent and Returned by Level and Type of Institute in the Census

	Level A		Level B	
	Unitary	Sequential	Unitary	Sequential
Sent	2250	512	684	248
Returned	1883	436	558	210

At this point it is well to consider the non-response of special clusters of institutes, since these clusters were considered in the analyses (see Chapter IV). There were three[2] relatively large clusters of institutes in the Census. These subgroups and the proportions of non-response are as follows:

1. Institutes concerned with implementation projects - 2,049 questionnaires sent and 1,725 returned for a non-response proportion of .158.

2. Institutes designed for junior high teachers - 1,920 questionnaires sent and 1,635 returned for a non-response proportion of .148.

3. Institutes oriented to social sciences such as psychology and economics - 756 questionnaires sent and 644 returned for a non-response proportion of .148.

Since the Census did not involve random sampling, it was not appropriate to apply inferential statistics to differences observed in the cells. That is, the tabulations in the cells or categories determined by levels, disciplines, or types represent population response (or non-response) and there

[2]The bases on which these clusters were found are not mutually exclusive, e.g. junior high and implementation institutes could appear in more than one cluster. Therefore, the totals for the three groups exceed the Census totals of questionnaires sent and returned.

was no element of random fluctuation. However, on the basis of the results, there does not appear to be any marked inconsistencies in the response patterns for the Census. Breakdowns by discipline or institute type within the larger classifications of institutes were susceptible to individual factors[3] and do not merit detailed discussion here.

Non-Response In The Sample

The overall response of the Sample was 1,389 questionnaires returned from the mailing of 1,758 for a return rate of 79.01 per cent. The numbers of questionnaires sent to participants in Unitary and Sequential institutes were almost equal, being 878 and 880 respectively. The rates of return were 78.82 per cent and 79.20 per cent for Unitary and Sequential respectively. Thus, the proportions of non-response were .2118 and .2080. This difference in proportions of non-response of .0038 was statistically tested[4] and was found to be not significant at the .05 level of significance (Z = .40, which does not even approach significance at the .05 level). Thus, the difference

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[3]For example, an isolated institute exhibiting poor response may have had its participants unduly affected by a factor such as school reorganization, causing considerable moving instability. Such factors are beyond the control of either the individual institute or the SI program.

[4]The use of inferential statistics was appropriate with the Sample group. The samples comprised random samples of the original group, and thus their measures such as proportions, are statistics (in contrast to parameters in the Census group). As statistics they were subject to random sampling fluctuation, and possessed underlying distributions with location and variance. When comparing two proportions, for example, tested are the hypotheses that the proportions came from populations with equal proportions, (of, in this case, non-response) and that their difference was no more than expected due to random sampling fluctuation. A test which was statistically not significant, indicated that the difference was no more than expected due to random fluctuation given a specified probability, the level of significance.

in proportions of non-response between Unitary and Sequential institutes was no more than expected on the basis of random fluctuation.

Considering non-response in the levels, the proportions were .2506 and .1748 respectively for Levels A and B. This difference of .0758 in the proportions of non-response was statistically significant at the .05 level. Thus the difference in proportions of non-response between the levels was more than can be reasonably ascribed to random fluctuation. When considering the proportions of non-response in a fourfold table we get the following results.

	A	B
Unitary	.243	.169
Sequential	.263	.178

A summary of the numbers of questionnaires sent and returned for the Sample is presented in Table 2.03.

TABLE 2.03

Numbers of Questionnaires Sent and Returned by Level and Type of Institute in the Sample

	Level A		Level B	
	Unitary	Sequential	Unitary	Sequential
Sent	506	308	372	572
Returned	383	227	309	470

A cluster of institutes that assumed considerable importance in the analysis of data was a group called the non-implementation group of the Sample, a subset of the Sample. This group included both Unitary and Sequential institutes. Levels A and B represented the Physical Sciences (including Earth Science and General Science), Mathematics and Multiple

Fields. The rationale for singling out these institutes as a cluster is described in Chapter III.

There were 1,528 questionnaires sent to participants of the non-implementation SIs of the Sample and 1,256 were returned. Thus, the proportion of non-response for this group was .206. Coming from the Sample, this proportion was a statistic. As such it was possible to construct a confidence interval for this proportion. The 95 per cent confidence interval for the proportion was given by the interval .186 to .226. This interval spanned the proportions of non-response for both Sequential and Unitary SIs of the Sample. It spanned the overall proportion of non-response in the Sample which was certainly not surprising since the non-implementation institutes of the Sample comprised the major portion of it. The confidence interval did not span the proportions of non-response for either Level A or Level B of the Sample. Therefore, the differences in proportions of non-response in the non-implementation group of the Sample and these latter two groups are more than what can be attributed to random sampling fluctuation.

Another cluster of institutes was the implementation SIs of the Sample Group. The participants of this cluster received 176 questionnaires and returned 133, for a relatively low non-response proportion of .144. This proportion was not spanned by the confidence interval for the proportion of non-response in the non-implementation group of the Sample.

Summary

In considering the patterns of non-response in terms of the proportions of various subgroups of SIs, there was considerable consistency among the various groups. The confidence interval for the proportion of non-response in the non-implementation group of the Sample did not span all the proportions

of other subsets of the Sample. It should also be noted that the interval did not span any of the proportions of non-response of the Census Group whose proportions were all lower than the lower limit of the interval. These proportions were parameters. As such they did not have variance. However, there was a possibility of the confidence interval spanning the Census proportions. Since the confidence interval, estimating the proportion of the population from which part of the sample was selected, did not span the Census proportions, the hypothesis that the population had a proportion of non-response (hypothetical, of course) equal to any of the Census proportions could not be entertained.

The proportions of non-response for various groups have been reported in this chapter. The reader is left to make his own judgments as to any bias in the patterns of non-response. He is also reminded that due to the large numbers of questionnaires sent, any statistical test resulted in high precision and correspondingly high power. The statistical results, therefore, have small standard errors resulting in very small confidence intervals. It can be inferred that the patterns of non-response were markedly consistent across the groups, and the results of no one group are considered biased due to a heavy concentration of non-response in that group.

The questionnaire that respondents were requested to complete was long and somewhat complex. Respondents were approximately fifteen months removed from the 1970 SI experience. Yet the overall response rate of questionnaires returned exceeded 82 per cent. For a survey of this magnitude that rate of response, in the opinion of the investigators, is noteworthy.

CHAPTER III

OVERVIEW OF THE ANALYSES

The characteristics of the Census and Sample warranted two very different analyses. The Census, as described in Chapter II, included institutes whose participants all received the questionnaire. Thus the proportions, means, etc. are parameters, not statistics. Inferential statistics were not appropriate for these data because there were no inferences to be made. Statistical inference allows the generalization of sample results to the population from which the sample was randomly drawn. However when everyone in the population was included in the data gathered, there was no need for an inference; in fact, the values to be inferred were already in hand.

For the second group, the Sample, statistical inference was appropriate. In this group 10 per cent of the participants of the institutes were randomly selected to receive the questionnaire. Hence, the sample means, proportions, etc. would most likely change if a different random sampling were taken. That is, responses were not obtained from every participant in this group, but responses were obtained from a random sample of these participants. Thus it was possible to estimate the responses of all participants from the values obtained in the random sample.

These estimates could take the form of a point estimate or a confidence interval. A point estimate would be a single mean or proportion which would best estimate the corresponding population parameter. A confidence interval would be a band of points which would have a predetermined probability of spanning the population parameter. The usual probability level chosen for such confidence intervals is .95, i.e., the probability that the confidence interval spans the parameter is .95. Correspondingly, the

parameter would be spanned in 95 per cent of the confidence intervals. The benefit of using a confidence interval is that it allows one to make a probability statement while the use of a single point estimate has a probability of zero of coinciding with the population parameter.

In the Census, the parameters were reported in the analysis. In the Sample a combination of point and interval estimates of the corresponding parameters were reported.

Data Checks

The initial step in the analysis consisted of running utility programs to check the accuracy of the punched cards. These analyses insured that the five cards per subject were properly grouped and sequenced. A few coding or other errors which resulted in illegal data characters were corrected before any group comparisons were made.

Selection of the Reference Group as a Subset of the Sample

To facilitate the interpretation of the large amount of data gathered in this survey, the non-implementation institutes of the Sample were considered a reference group and .95 confidence intervals were established where appropriate. This basic group, or reference group, allowed in-depth comparisons among the institute types. For example, it allowed one to readily see whether Physics institutes as a group had response patterns on some items that distinguished them from the general pattern of the responses on those items.

The reference group was effective because it represented the remaining SIs very well after removal of the implementation, predominately junior high science institutes and social science institutes. This group included institutes from nine disciplines, two levels of participants' academic

backgrounds and both Unitary and Sequential institutes. Thus the reference group was comprised of predominately non-implementation senior high science institutes and junior and senior high mathematics institutes.

Comparisons Among Groups

Several comparisons were made among various types of institutes. Parallel analyses were run on the Census and Sample to find the parameters and estimates of the corresponding parameters respectively. When appropriate, results of the separate comparison groups were compared to the reference group of the Sample.

Results obtained by comparing the following types of institutes are presented in Chapter IV while more detailed discipline and implementation institute results are presented as appendices.

Among the Census institutes:

1. The pooled implementation institutes
2. The Social Science institutes
3. The institutes for supervisors

Among the Sample institutes:

1. The reference group
2. The Level A institutes
3. The Level B institutes
4. Unitary institutes
5. Sequential institutes

It was felt that these types of institutes accurately reflected the composition of the two major groups, the Census and the Sample. These groupings were identified by NSF as institute types which needed explicit description. The specific discipline and implementation institutes assigned to each group are shown in Table 3.01.

TABLE 3.01

Selected Institutes in the Sample and Census

Group	Disciplines*	Implementation Institutes
Census		
	EZ Earth Science	ECCP Engineering Concepts Curriculum Project
	GG Geography	ESCP Earth Science Curriculum Project
	PS Psychology	ISCS Intermediate Science Curriculum Study
	SE Economics	IPS Introductory Physical Science
	SO Sociology	HPP Harvard Project Physics
		UICSM University of Illinois Committee on School Mathematics
		SRSS Sociological Resources for the Social Studies
Sample		
	BZ Biology	NONE
	CH Chemistry	
	EZ Earth Science	
	GS General Science	
	MA Mathematics	
	PY Physics	
	XX Multiple Fields	

*Engineering, Mathematics, and Physics institutes surveyed in the Census consisted entirely of implementation institutes.

Standard Analysis for Institute Effect

The wealth of information gathered in the questionnaire required systematic consideration so that manageable and interpretable data could be maximized and maintained. The project staff under NSF direction selected the following analyses to be run on each of the aforementioned groups of institutes. The results of these analyses are presented in Chapter IV of this report.

In the demographic data, institute participants were categorized into six categories, men and women in three age classifications (under 30, 30 to 39, and over 39). Respondents also indicated one of four categories for their teaching assignments in 1970-71: senior high, junior high, cannot distinguish, or other level.

To assess the immediate effects of SI attendance on the participants, results obtained from the items of Section III of the questionnaire were examined. Any outcome mentioned in this section was directly attributable to participation in NSF-supported institutes. The number and proportion of participants who experienced each of the listed possible effects are reported. Confidence intervals around these proportions were computed for the basic reference group of the Sample. These intervals spanned the corresponding parameters with a predetermined probability. Such intervals yielded a referent for the point estimates of the Sample subunits. For example, the results of Chemistry institutes in the Sample were compared to these confidence intervals to indicate whether participants of Chemistry institutes had response patterns which differed from the general pattern of responses.

A major portion of the survey, Section IV, dealt with generally recognized educational needs. Examples of these needs were "adapting instruction to slow learners" and "obtaining additional laboratory equipment." Respondents were asked to indicate which of the listed needs were particularly important to their subject area and which of these needs were met by the 1970 Summer Institute or by a cumulative effect of NSF-supported institutes. A ratio of needs met to needs perceived by the participants was computed for each need listed. This was done by dividing the number of participants who indicated that the 1970 SI helped to meet that need by the number of participants who had expected that need to be met. Hence, ratios close to unity indicated that expected needs were being met. Ratios greater than 1.00 indicated that more needs were met than participants had anticipated. Note that confidence intervals were constructed for the basic reference group on results obtained from the items of Section III of the questionnaire.

Section V of the questionnaire was a compendium of possible effects of institute attendance on classroom practices. To achieve some parsimony in data reporting the items were combined into two subscales. The first subscale (Items 65-70, 80-81, 83, 87-89) contained "feeling tone" items such as "increased your ability to judge content for your classes." The second subscale (Items 71-79, 82, 84-86) contained "action" items such as "led you to introduce laboratory experiences into courses that previously contained none."

Scores for these two subscales were reported for each group receiving the standard analysis. Confidence intervals around the scores were computed for the reference group. The corresponding values for all other groups were compared to the confidence intervals of the reference group to determine whether the point estimates were outside the confidence interval.

When a particular subset of institutes departed from the reference group in either direction, it constituted evidence of the differential effects of various institute types.

Additional Analyses for Total and Selected Groups

Besides the standard analyses for the separate types of institutes in the Census and Sample, several additional analyses were performed. These results are presented in Chapter V. For institutes involved with the implementation of specific curriculum projects, frequency distributions were reported for Items 102 to 105, Section VII, to assess the degree to which implementation was taking place.

Additional analyses were conducted to determine whether teachers were actually teaching within the discipline or related areas of the institute that they attended. A cross tabulation of institute participants by discipline and subject(s) taught was prepared to determine the number of teachers teaching the discipline of the institute. The ratio of total number of classes taught in each subject to the number of participants teaching that subject revealed the average class load per teacher. For example, the number of participants in Mathematics institutes teaching mathematics was determined. Also the average number of mathematics classes taught by these teachers was determined. Confidence intervals were constructed for each discipline in the Sample. Confidence intervals were not appropriate for the Census.

The extent of supervisory responsibilities was assessed for the Census, the Sample, and the SU (supervisors) institutes. These analyses indicated whether the appropriate selection techniques were being used in SU institutes. Also SU institutes, implementation institutes, and non-implementation institutes were contrasted based on information obtained

from Item 90 of the questionnaire, "The extent to which your institute training has been used to supervise the math/science programs in your school."

Average grade enrollment was cross-tabulated with the "feeling tone" and "action" items of Section V and Item 33, "moved to another school" to assess the association between school size and these outcomes for the Sample and the Census.

The patterns of previous institute attendance were closely investigated for the several disciplines. Participants were classified according to three levels of previous attendance in NSF supported programs. One group, none, was comprised of teachers who had attended no previous institutes. Participants with a heavy pattern of previous attendance were those who had attended an Academic Year Institute or more than two previous Summer Institutes. All other patterns of previous attendance were termed moderate. Participants in these three categories were then further classified according to age and sex within each separate discipline of the Sample and Census.

Section VI of the questionnaire asked participants to rank order the NSF Summer Institute objectives. The rankings were done twice; first as they had anticipated the institutes prior to attending them, and second, the way they perceived the institutes after they were finished. These rankings were then compared to a similar ranking of these objectives by the institute directors. The results of ten representative institutes were then analyzed to indicate the extent of director-participant agreement. These institutes were selected to represent Sample and Census institutes, Unitary and Sequential institutes, and implementation and non-implementation institutes. The institutes selected also had questionnaire return rates in excess of 90 per cent so that reliable results could be obtained.

The analyses for this study were determined cooperatively by NSF and the project staff. They combined the data and contrasted separate institute types in a manner which maximized the useful information needed for NSF policy decisions. The organization of data was designed to show the effects of various kinds of Summer Institutes that were offered in 1970 and an in-depth examination of their participants. In addition these data could be used as a source for individuals interested in other aspects of NSF institutes and their participants.

CHAPTER IV

RESULTS OF STANDARD ANALYSIS

As described in Chapter III, data from the questionnaire were pooled so that the following groups could be examined and compared:

1. Non-Implementation institutes of the Sample,
2. Level A institutes of the Sample,
3. Level B institutes of the Sample,
4. Unitary institutes of the Sample,
5. Sequential institutes of the Sample,
6. Implementation institutes of the Census,
7. Social Science institutes of the Census, and
8. Supervisors institutes of the Census.

Additional data for the individual implementation groups of the Census, for the Census institutes pooled according to disciplines, and for the Sample institutes pooled according to disciplines are provided in Appendices D-H.

The groups were compared using the following data:

1. Age and sex,
2. Level of 1970 teaching assignment,
3. Immediate effects of institute attendance on participants (Section III of the questionnaire),
4. Immediate effects of institute attendance in helping participants to meet perceived educational needs (Section IV of the questionnaire),
5. Immediate effects of institute attendance on classroom procedures (Section V of the questionnaire).

Comparisons of the Age-Sex Distributions

The age-sex distributions of the non-implementation group of the Sample is shown in Table 4.01. Each cell of the table gives the number of

participants, the per cent this number is of the total group of participants, and the .95 confidence interval. The bottom row of the table shows what per cent of each age group was female.

TABLE 4.01

Age-Sex Distributions of the Non-Implementation (Reference) Group of the Sample

	Under 30	30-39	Over 39	Total
Male	346 (.28) .26-.30	380 (.31) .28-.34	189 (.15) .13-.17	915 (.74) .72-.76
Female	126 (.10) .08-.12	97 (.08) .07-.09	104 (.08) .07-.09	327 (.26) .24-.28
Total	472 (.38) .35-.41	477 (.39) .36-.42	293 (.24)* .22-.26	1242
% Female	(.27)	(.20)	(.35)	

*Because of rounding errors the total per cents may sometimes differ from the sums of per cents in rows or columns.

Table 4.01 shows that approximately three fourths of the participants in the non implementation group of the Sample were male and one fourth were female. About three eights of the participants were under 30 years old, about three eights were between 30 and 39 years old, while only about one fourth were over 39 years old. The distribution of the male participants showed a small peak for the 30-39 group, and a sharp decline for the over 39 group. The female participants, on the other hand, were more evenly distributed among the age groups. This caused a statistical artifact consistently appearing throughout these data, which shows that a much larger proportion of SI participants among the over 39's were female and a smaller proportion of the 30-39 groups were female. The slight dip in number of female

participants in the decade of the 30's, shown in Table 4.01, will be seen as a more pronounced phenomenon later, particularly in the data from mathematics teachers.

The implementation group of the Census (Table 4.02) was different from the non-implementation group of the Sample in many ways. The implementation group had more males - 78 per cent versus the 74 per cent males in the non-implementation group. It was also a much older group with 39 per cent of the participants over 39 years old as compared to only 23 per cent of the non-implementation group in that age group, and with only 24 per cent of the participants under 30 years of age as compared to 38 per cent for the non-implementation group.

TABLE 4.02

Age-Sex Distributions of the Implementation Group of the Census

	Under 30	30-39	Over 39	Total
Male	317 (.19)	516 (.30)	498 (.29)	1331 (.78)
Female	100 (.06)	103 (.06)	170 (.10)	373 (.22)
Total	417 (.24)	619 (.36)	668 (.39)	1704
% Female	(.24)	(.17)	(.25)	

The two distributions were similar only in the per cents of males in the 30-39 range, but the greatest differences were in the per cents of males under 30 (.19 for the implementation group of the Census versus .28 for the non-implementation group of the Sample) and in the per cents of males over 39 (.29 vs. .15). In the Census the largest percentage of females was in the over 39 age group while in the reference group of the Sample the largest percentage was in the under 30 age group.

The sex distributions for the Levels A and B institutes (Table 4.03) of the Sample were similar to that of the reference[1] group. However both age distributions were different from each other and from the age distribution of the reference group. The Level B participants tended to be younger than the reference group participants while the Level A participants tended to be older. Note that the distributions for Levels A and B were similar only in the per cent of males between 30 and 39, the per cent of females between 30 and 39, and the total per cent of participants between 30 and 39.

TABLE 4.03

Age-Sex Distributions of the Levels A and B Groups of the Sample

	Under 30	30-39	Over 39	Total
Male				
Level A	130 (.22)	185 (.31)	113 (.19)	428 (.72)
Level B	242 (.31)	233 (.30)	105 (.14)	580 (.75)
Female				
Level A	51 (.09)	54 (.08)	63 (.11)	168 (.28)
Level B	88 (.11)	53 (.07)	55 (.07)	196 (.25)
Total				
Level A	181 (.30)	239 (.40)	176 (.30)	596
Level B	330 (.43)	286 (.37)	160 (.21)	776
% Female				
Level A	(.28)	(.23)	(.36)	
Level B	(.27)	(.19)	(.34)	

[1]Since .95 confidence intervals were computed for the non-implementation group of the Sample for comparative purposes, that group was referred to as the reference group.

Table 4.04 shows the age-sex distributions of the Unitary and Sequential groups of the Sample. It should be noted that the total percentages of males and females are within the .95 confidence interval of the reference group. The total per cent in the 30-39 age group is also within the .95 confidence interval of the reference group, but the total per cents for the other age groups are different from those of the reference group. The participants of the Unitary group were older than the reference group participants while the participants of the Sequential group were younger than those of the reference group. These differences were primarily among the male members of the under 30 group (.20 Unitary vs .34 Sequential) and the male members of the over 39 group (.22 Unitary vs .10 Sequential). Note the different patterns of distributions of males and females in the Unitary institutes. The largest per cent of males is in the 30-39 group, while this same age group contains the smallest per cent of females. Sequential institutes, on the other hand, show the largest per cent for both sexes below age 30 and a steady decline thereafter. It could be hypothesized that since Sequential institutes tended to offer opportunities for significant progress toward graduate degrees in subject matter, the appeal of these SIs to younger teachers is obvious. They served the function of emphasizing subject matter degrees to younger members of the profession who probably intended to obtain Masters degrees because of increased salary benefits, but who might have otherwise settled for less substantive content.

TABLE 4.04

Age-Sex Distributions of the Unitary and Sequential Groups of the Sample

	Under 30	30-39	Over 39	Total
Male				
Unitary	139 (.20)	205 (.30)	150 (.22)	494 (.73
Sequential	233 (.34)	213 (.31)	68 (.10)	514 (.74)
Female				
Unitary	68 (.10)	46 (.07)	73 (.11)	187 (.27)
Sequential	71 (.10)	61 (.09)	45 (.07)	177 (.26)
Total				
Unitary	207 (.30)	251 (.37)	223 (.33)	681
Sequential	304 (.44)	274 (.40)	113 (.16)	691
% Female				
Unitary	(.33)	(.18)	(.33)	
Sequential	(.23)	(.22)	(.40)	

The age-sex distribution of the Social Science institutes of the Census is given in Table 4.05. The sex distribution of the Social Science participants was like that of the reference group, but the age distribution was not. The Social Science participants were generally older than the reference group participants with only .23 under 30 (vs .38 for the reference group) and .37 over 39 (vs .23 for the reference group). These age differences occurred in both the male and female groups. Note that more than half of the females were over 39.

TABLE 4.05

Age-Sex Distributions of the Social Science Group of the Census

	Under 30	30-39	Over 39	Total
Male	73 (.18)	132 (.33)	98 (.25)	303 (.76)
Female	20 (.05)	26 (.07)	50 (.13)	96 (.24)
Total	93 (.23)	158 (.40)	148 (.37)	399
% Female	(.22)	(.16)	(.34)	

The Supervisors group of the Census (Table 4.06) was very much different from any of the preceding groups. It was overwhelmingly male (.87 vs .74 for the reference group) and older (.56 over 39 vs .24 for the reference group and .09 under 30 vs .38 for the reference group). Note that almost half of the Supervisors responding to the questionnaire were males over 39 years old.

TABLE 4.06

Age-Sex Distributions of the Supervisors Group of the Census

	Under 30	30-39	Over 39	Total
Male	9 (.08)	37 (.32)	56 (.48)	102 (.87)
Female	1 (.01)	5 (.04)	9 (.08)	15 (.13)
Total	10 (.09)	42 (.36)	65 (.56)	117
% Female	(.10)	(.12)	(.14)	

Table 4.07 shows the age-sex distributions of a sample of all Science, Mathematics, and Social Science teachers from a survey taken during the

1968-69 school year.[3] Comparisons of these distributions to each of the preceding distributions suggests, among others, the following:

1. Over 50 per cent of the Mathematics teachers in the United States (Table 4.07) were under 30 while only 40 per cent of the participants in Mathematics SIs (Table 4.08) were under 30.

2. The total population of Science teachers (Table 4.07) was a younger group than the group of General Science participants in the Census (Appendix, Table D 10), with 46 per cent, 27 per cent, and 27 per cent in the three age groups respectively as compared to 27 per cent, 40 per cent, and 33 per cent.

3. Females between 30 and 39 account for 7 per cent of the Social Science institute participants but only 3 per cent of the total social science teacher population.

Obviously, many other such comparisons between the groups of institute participants and the total teacher population can be made. Of particular interest may be the comparisons between these data and the corresponding data for mathematics and science (non-mathematics) teachers of the reference group of the Sample (Table 4.08). Note that the mathematics and science institute participants have very different age-sex distributions from the mathematics and science teacher population as a whole. Table 4.08 also shows interesting differences between participants of mathematics institutes and participants of science institutes. For example, in mathematics there was a decided peak in the number of male participants in the 30 to 39 age group, while in science there was little difference between the number of males in the 30 to 39 age group and the number of males under 30. In mathematics the 30 to 39 age group contained the fewest females while in science this age group contained the most females. In both mathematics and science the over 39 age groups showed the highest ratios of females to males.

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[3]Hershkowitz, Martin; Characteristics of Discipline/Cross-Discipline Teachers and National Science Foundation Program Participants and Non-Participants: Contract NSF-C565 Technical Report No. 01024.02-2 (p. 150).

TABLE 4.07

Age-Sex Distributions of Science, Mathematics, and Social Science Teachers in the United States During the 1968-69 School Year

	Under 30	30-39	Over 39	Total
Male				
Mathematics	535 (.34)	219 (.14)	225 (.14)	979 (.62)
Science	548 (.35)	359 (.23)	270 (.17)	1177 (.75)
Social Studies	311 (.33)	190 (.20)	154 (.16)	655 (.70)
Female				
Mathematics	273 (.17)	90 (.06)	228 (.15)	591 (.38)
Science	170 (.11)	69 (.04)	154 (.10)	393 (.25)
Social Studies	132 (.14)	26 (.03)	128 (.14)	286 (.30)
Total				
Mathematics	808 (.51)	309 (.20)	453 (.29)	1570
Science	718 (.46)	428 (.27)	424 (.27)	1570
Social Studies	443 (.47)	216 (.23)	282 (.30)	941
% Female				
Mathematics	(.34)	(.29)	(.50)	
Science	(.24)	(.16)	(.36)	
Social Studies	(.30)	(.12)	(.45)	

TABLE 4.08

Age-Sex Distributions of the Mathematics and Science Sub-Groups of the Reference Group

	Under 30	30-39	Over 39	Total
Male				
Mathematics	148 (.26)	174 (.31)	78 (.14)	400 (.71)
Science	198 (.29)	206 (.31)	111 (.16)	515 (.76)
Female				
Mathematics	76 (.13)	38 (.07)	53 (.09)	167 (.29)
Science	50 (.07)	59 (.09)	51 (.08)	160 (.24)
Total				
Mathematics	224 (.40)	212 (.37)	131 (.23)	567
Science	248 (.37)	265 (.39)	162 (.24)	675
% Female				
Mathematics	(.34)	(.18)	(.40)	
Science	(.20)	(.22)	(.31)	

Other age-sex distributions are given in Appendix D as follows:

Tables D 1 - D 7 Disciplines of the Sample

Tables D 8 - D 13 Disciplines of the Census

Tables D 14 - D 20 Implementation Groups of the Census

Comparisons of Level of 1970 Teaching Assignment Distributions

Respondents were asked to indicate whether their 1970 teaching assignments were primarily senior high school or junior high school. They were given four choices: junior high school, senior high school, cannot distinguish, and other. Table 4.09 shows the teaching assignment distributions for the eight major groups discussed in this chapter. Each cell contains the number of respondents giving the indicated response

and the per cent that number is of the total number of respondents. In addition, the .95 confidence intervals are given for the reference group (non-implementation group of the Sample). The "omit" column of the table shows how many respondents omitted the items on the questionnaire.

TABLE 4.09

Teaching Assignment Distributions of the Eight Major Analysis Groups

	Junior High	Senior	Level of Assignment		Other	Omit
			High	Cannot Distinguish		
Non-implementation (Sample)	336 .27 (.25-.29)	794 .63 (.60-.66)	41 .03 (.02-.04)		29 .02 (.01-.04)	56 .04 (.03-.05)
Implementation (Census)	665 .39	903 .52	41 .02		58 .03	58 .03
Level A (Sample)	222 .37	307 .52	17 .03		18 .03	32 .05
Level B (Sample)	151 .19	567 .71	29 .04		15 .02	31 .04
Unitary (Sample)	248 .36	376 .54	22 .03		18 .03	28 .04
Sequential (Sample)	125 .18	498 .71	24 .03		15 .02	35 .05
Social Science (Census)	94 .23	275 .68	4 .01		13 .03	21 .05
Supervisors (Census)	19 .16	74 .63	4 .03		16 .14	5 .04

None of the last seven groups listed was like the reference group. The Implementation group, Level A group, and Unitary group each had a much higher proportion of junior high school teachers than did the reference group, while the others had lower proportions of junior high school teachers.

Other teaching assignment distributions are given in Appendix E as follows:

Table E 1 Disciplines of the Sample

Table E 2 Disciplines of the Census

Table E 3 Implementation Groups of the Census

Comparisons of the Immediate Effects of Institute Participation on Participant's Duties and Status

Below is a copy of Section III of the questionnaire. The words given in parentheses for each item of the questionnaire have been added and will be used on the tables that follow to help the reader recall the items without referring back to this page.

Section III

The following items refer to changes in your professional duties and status. Indicate the effects which are directly attributable to your participation in the 1970 Summer Institute (SI). (If you have participated in NSF-supported institutes before that time, your answer should reflect the cumulative effect of all institutes attended through the summer of 1970.)

		Yes	No
33.	Moved to another school (Moved)	____	____
34.	Received a different teaching assignment (Dif. Asmt.)	____	____
35.	Received a special purpose teaching assignment, such as a class for exceptional children or children with special needs. (Sp. Asmt.)	____	____
36.	Received a more advanced teaching assignment, i.e. more sophisticated subject matter (Adv. Asmt.)	____	____
37.	Assigned to curriculum supervision (Sup.)	____	____
38.	Became a department chairman or its equivalent (Dept. Ch.)	____	____
39.	Received a reduced teaching load or released time for curriculum development or related activities (Red. Load)	____	____

	Yes	No
40. Assigned curriculum development without released time, for example, curriculum committee assignment (Curr. Dev.)	____	____
41. Conducted or otherwise arranged for in-service training of other teachers (In-serv.)	____	____

Table 4.10 gives the distributions of Yes responses to each item of Section III for the eight major analysis groups. Each cell of the table shows the number of respondents marking Yes for the indicated item and the per cent that number is of the total number of respondents. In addition the .95 confidence intervals are given for the reference group (non-implementation group of the Sample).

Much information is contained in the table but only examples of the comparisons that can be made are given below.

For each group, except supervisors, the greatest per cent of positive responses was for Item 36 (received a more advanced assignment), and in all of those cases that per cent fell within the .95 confidence interval for the reference group. In all groups, except Social Science and Supervisors of the Census, the least positive response was on Item 39 (received a reduced teaching load to do curriculum development), and again all of these per cents fell within the .95 confidence interval for the reference group. In fact, with the exceptions again of the Social Science and Supervisors groups, there were almost no significant differences between the reference group and the other groups, and when the differences were significant the per cents were only one point outside of the confidence intervals.

The responses to Items 34, 35, and 36 when combined point out that a very common result of institute attendance was a change in teaching assignment. The responses to Items 39 and 40 when combined suggest

that although they seldom received released time for it, respondents often became involved in curriculum revision as a result of institute attendance.

The Supervisors group was much different from the other groups, but that was to be expected because the participants were basically established in leadership positions before attending the institutes.

TABLE 4.10

Distributions of Yes Responses to Section III Items
for the Eight Major Analysis Groups

Group	Item 33 Moved	34 Dif. Asmt.	35 Sp. Asmt.	36 Adv. Asmt.	37 Sup.	38 Dept. Ch.	39 Red. Load	40 Curr. Dev.	41 In-Serv.
Non-implementation (Sample)	189 .15 (.13-.17)	358 .29 (.27-.31)	156 .12 (.10-.14)	474 .38 (.35-.41)	150 .12 (.10-.14)	243 .19 (.17-.21)	83 .07 (.06-.08)	292 .23 (.21-.25)	131 .10 (.08-.12)
Implementation (Census)	277 .16	631 .37	317 .18	610 .35	294 .17	420 .24	186 .11	516 .30	384 .22
Level A (Sample)	97 .18	159 .29	72 .13	195 .35	61 .11	110 .20	36 .07	117 .21	60 .11
Level B (Sample)	92 .13	199 .28	84 .12	279 .40	89 .13	133 .19	47 .07	175 .25	71 .10
Unitary (Sample)	98 .14	223 .32	106 .15	269 .39	76 .11	124 .18	48 .07	162 .23	87 .13
Sequential (Sample)	109 .16	182 .26	81 .12	268 .38	92 .13	150 .22	48 .07	167 .24	67 .10
Social Science (Census)	37 .09	128 .31	39 .10	157 .39	64 .16	92 .23	46 .10	129 .31	75 .18
Supervisors (Census)	21 .18	46 .39	21 .18	53 .45	53 .45	53 .45	37 .31	41 .35	60 .51

Positive responses to Items 33 through 41 indicated that some concrete changes in professional duties and status were directly attributed to institute attendance. Table 4.11 lists the numbers and per cents of respondents who made no positive responses to Section III items and, presumably, could not attribute any changes in duties and status to institute attendance.

TABLE 4.11

Distributions of Respondents Who Had No Marks in the Yes Column for Section III Items

Group	Number	Per Cent
Census Implementation	371	21.5
Census Non-Implementation	333	24.4
Sample Implementation	32	24.1
Sample Non-Implementation	348	27.7
Total Census	704	22.8
Total Sample	380	27.4

For each of these groups, roughly one fourth of the respondents did not have any marks in the Yes column for Section III items of the questionnaire. Stating this positively, about three fourths of all respondents indicated that institute participation contributed directly to changes in duties or status in the year following attendance.

Further distributions of responses to items in Section III are given in Appendix F as follows:

Table F 1 Disciplines of the Sample

Table F 2 Disciplines of the Census

Table F 3 Implementation Groups of the Census

Comparisons of the Immediate Effects of Institute Attendance in Helping Participants to Meet Perceived Educational Needs

Section IV of the questionnaire (reproduced below) dealt with generally recognized educational needs. Respondents were asked which of twenty-three listed needs were especially important to their subject areas (Column A); which of the needs they expected the summer institutes to help them meet (Column B); which of the needs the 1970 SIs actually did help them to meet (Column C); and which of the needs the cumulative effect of all institute experience, if they had institute experience prior to the 1970 SI, helped them to meet (Column D). The words in parentheses after each item of the questionnaire have been added and will be used on the tables that follow to help the reader recall the items without referring back to these pages.

Section IV

This section lists numerous generally recognized educational needs. In each of the columns check those needs that apply as follows:

A. Which of the educational needs do you feel are particularly important to you for the teaching of your subject? (Check in column A.)
B. Which needs had you expected the 1970 SI to help you in meeting? (Check in column B.)
C. Which needs did the 1970 SI actually help you in meeting? (Check in column C.)
D. Answer this item if you had experience in NSF-supported institutes prior to the 1970 SI.
Which needs did your total institute experience actually help you in meeting? (Check in column D.)

		A Your needs in teaching the subject	B Your Expectations for the SI	C Your needs which the 1970 SI helped to meet	D Cumulative Effect
42	Individualizing learning (Indv.)	____	____	____	____
43	Adapting instruction to slow learners (Slow)	____	____	____	____
44	Adapting instruction to high ability students (Able)	____	____	____	____
45	Adapting inductive (discovery) methods of teaching (Induct.)	____	____	____	____
46	Having students become more actively involved in the learning process (Active Invol.)	____	____	____	____
47	Motivating reluctant learners (Motivate)	____	____	____	____
48	Providing more courses in your subject area for non-college bound students (Non-college)	____	____	____	____
49	Providing for continuous progress of students (self-paced learning) (Self-paced)	____	____	____	____
50	Providing content for courses utilizing computers (Computers)	____	____	____	____
51	Using computer-assisted instruction (Comp. Asst. Inst.)	____	____	____	____
52	Up dating subject-matter background (Up-date)	____	____	____	____
53	Introducing teachers to new curriculum developments (Curr. Dev.)	____	____	____	____
54	Relating science and non-science areas through interdisciplinary (Interdiscp.)	____	____	____	____
55	Fusing science courses and/ or science and math courses (Fusing)	____	____	____	____
56	Providing teachers with greater in-depth training (e.g. master's degree, etc.) (In-depth)	____	____	____	____

57	Providing teachers with refresher study (Refresh.)	___	___	___	___
58	Strengthening teachers' backgrounds in allied subjects (Allied Subs.)	___	___	___	___
59	Developing courses specifically designed for local students (Local)	___	___	___	___
60	Providing teachers with actual research experience (Research)	___	___	___	___
61	Utilizing resources outside of the school (Outside Resources)	___	___	___	___
62	Using existing laboratory space and materials more effectively (Effective Lab. Use)	___	___	___	___
63	Obtaining additional laboratory facilities (Add. Lab. Space)	___	___	___	___
64	Obtaining additional laboratory equipment (Add. Lab. Equip.)	___	___	___	___

Table 4.12 shows the distributions of responses to the Section IV items for the reference group. Each entry in Columns A and C shows the per cent of the respondents who checked that need in Columns A and C of the questionnaire. The .95 confidence intervals are given in parentheses. Each entry of Column C/B is the ratio of the number of respondents who checked a need in Column C to the number of respondents who checked that same need in Column B. Confidence intervals were not appropriate for these entries. These ratios indicate how well expected needs were met by the 1970 Summer Institutes. A ratio less than 1.00 indicates the number of respondents who felt that a need was met was less than the number who expected the need to be met; that is, needs expected to be met were not completely met. A ratio greater than 1.00 indicates the number of respondents who felt a need was met, was greater than the number of respondents who expected the need to be met; that is, the institutes met the need better than was anticipated.

TABLE 4.12

Distributions of Responses to Section IV Items for the Non-Implementation (Reference) Group of the Sample

Item	A	C	C/B
42 (Indv.)	.64 (.61-.67)	.24 (.22-.26)	.85
43 (Slow)	.51 (.48-.54)	.12 (.10-.14)	.61
44 (Able)	.58 (.55-.61)	.41 (.38-.44)	.98
45 (Induct.)	.59 (.56-.62)	.36 (.33-.39)	.89
46 (Active Invol.)	.66 (.63-.69)	.32 (.29-.35)	.83
47 (Motivate)	.58 (.55-.61)	.16 (.14-.18)	.61
48 (Non-college)	.35 (.32-.38)	.08 (.07-.09)	.66
49 (Self-paced)	.37 (.34-.40)	.11 (.09-.13)	.76
50 (Computers)	.21 (.19-.23)	.11 (.09 .13)	.76
51 (Comp. Asst. Inst.)	.16 (.14-.18)	.08 (.07-.09)	.83
52 (Up-Date)	.67 (.64-.70)	.64 (.61-.67)	1.00
53 (Curr. Dev.)	.45 (.42-.48)	.33 (.30-.36)	.87
54 (Interdiscp.)	.33 (.30-.36)	.13 (.11-.15)	.87
55 (Fusing)	.33 (.30-.36)	.19 (.17-.21)	.98
56 (In-Depth)	.60 (.57-.63)	.59 (.56-.62)	.95
57 (Refresh.)	.54 (.51-.57)	.54 (.51-.57)	1.00
58 (Allied Subs.)	.46 (.43-.49)	.39 (.36-.42)	.98
59 (Local)	.22 (.20-.24)	.08 (.07-.09)	.78
60 (Research)	.25 (.23-.27)	.21 (.19-.23)	.97
61 (Outside Resources)	.32 (.29-.35)	.18 (.16-.20)	.99
62 (Effective Lab. Use)	.38 (.35-.41)	.20 (.18-.22)	.84
63 (Add. Lab. Space)	.23 (.21-.25)	.06 (.05-.07)	.79
64 (Add. Lab. Equip.)	.28 (.26-.30)	.10 (.08-.12)	.98

Most commonly checked in Column A of the questionnaire was the need to up-date subject matter background (Item 52). Sixty-seven per cent of the respondents checked this need. Sixty-four per cent felt that this need was met by the 1970 SIs. The ratio 1.00 in Column C/B indicates that the 1970 SIs met the need as expected.

The second ranked need in Column A was that of having students become actively involved in the learning process (Item 46). This need was not met as well by the 1970 SIs, as indicated by the .32 in Column C nor was it met as well as expected as indicated by the .83 in Column C/B. Also ranked high as needs were those of providing teachers with greater in-depth training (Item 56) and individualizing learning (Item 42).

The needs met most by the 1970 SIs were those listed in Items 52, 56, and 57 as indicated by the Column C responses of .64, .59, and .54, respectively.

Table 4.13 shows the distributions of responses to Section IV items for the implementation group of the Census. The greatest need perceived by the respondents of this group was the need to have students become actively involved in the learning process (Item 46). The response to this item (.74) was significantly greater than the response of the reference group. Individualizing instruction (Item 42) and using inductive methods (Item 45) were the next most commonly checked needs. In both cases the responses were higher than that of the reference group. Computers (Item 50) and computer assisted instruction (Item 51) were checked least.

TABLE 4.13

Distributions of Responses to Section IV Items
for the Implementation Group of the Census

Item	A	C	C/B
42 (Indv.)	.69	.45	1.02
43 (Slow)	.53	.31	.90
44 (Able)	.51	.39	1.05
45 (Induct.)	.65	.58	1.06
46 (Active Invol.)	.74	.63	1.01
47 (Motivate)	.61	.35	.85
48 (Non-college)	.37	.20	.92
49 (Self-paced)	.43	.26	.95
50 (Computers)	.16	.10	.93
51 (Comp. Asst. Inst.)	.13	.08	.99
52 (Up-Date)	.58	.50	1.00
53 (Curr. Dev.)	.53	.54	1.05
54 (Interdiscp.)	.35	.24	1.05
55 (Fusing)	.33	.18	1.04
56 (In-depth)	.39	.29	.96
57 (Refresh.)	.47	.40	1.04
58 (Allied Subs.)	.43	.35	1.00
59 (Local)	.24	.14	.98
60 (Research)	.23	.16	.93
61 (Outside Resources)	.35	.23	1.19
62 (Effective Lab. Use)	.42	.31	1.02
63 (Add. Lab. Space)	.27	.12	1.01
64 (Add. Lab. Equip.)	.36	.23	1.21

Column C shows that institute attendance most helped the respondents meet the needs given in Items 46 and 45 and least helped them with the needs listed in Items 50 and 51. The ratios in Column C/B are almost all near 1.00 indicating that the institutes met the participants' needs as expected. Generally speaking, the ratios were higher than the corresponding ratios for the reference group.

The distributions of responses for the remaining six major groups are given in Tables 4.14-4.19. The Column A distributions were very much alike and similar to the two preceding distributions. Items 42 (Individualizing), 45 (Adapting inductive methods), 46 (Active involvement), and 52 (Up-dating subject-matter backgrounds) were among the six most chosen items for each group. The only striking difference among the items picked most was Item 53 (Introducing teachers to new curriculum developments) which was the item picked most by the Supervisors group, but was not in the top five for any other group.

With respect to Column C, most of the groups checked Items 52 (Up-dating subject-matter backgrounds), 56 (Greater in-depth training), and 57 (Refresher study) as the needs the institutes met most. The Social Science group checked Item 58 (Strengthened backgrounds in allied subjects) more frequently than Item 56. The Supervisors and Implementation groups of the Census checked Items 45 (Adapting inductive methods), 46 (More active involvement), and 53 (Introducing new curriculum developments) more than any other items. These top three choices were completely different from the top three choices of the other groups.

The reader may make many other comparisons among the distributions of responses to items in Section IV given above and in the following tables which are in Appendix G.

Tables G 1 - G 7 Disciplines of the Sample

Tables G 8 - G 14 Disciplines of the Census

Tables G 15 - G 20 Implementation Groups of the Census

It should be noted that marked differences occurred in perceived needs of teachers in their classrooms and in the needs which institutes met according to disciplines of the institutes. Many of the responses such as emphasis on laboratory techniques in the laboratory science institutes and specific emphasis on curriculum projects in each of the implementation institutes were to be expected. There were, however, many not so obvious needs and expectations of each discipline group, and detailed studies by those with specialized interests would be well worth the effort.

TABLE 4.14

Distributions of Responses to Section IV Items for the Level A Group of the Sample

Item	A	C	C/B
42 (Indv.)	.65	.25	.84
43 (Slow)	.54	.14	.56
44 (Able)	.53	.37	.95
45 (Induct.)	.61	.36	.82
46 (Active Invol.)	.68	.34	.80
47 (Motivate)	.60	.19	.59
48 (Non-college)	.34	.08	.57
49 (Self-paced)	.39	.11	.66
50 (Computers)	.15	.04	.59
51 (Comp. Asst. Inst.)	.13	.04	.64
52 (Up-Date)	.63	.62	.99
53 (Curr. Dev.)	.46	.34	.87
54 (Interdiscp.)	.33	.13	.81
55 (Fusing)	.33	.19	1.01
56 (In-depth)	.54	.53	.95
57 (Refresh.)	.56	.57	1.01
58 (Allied Subs.)	.48	.42	.99
59 (Local)	.26	.09	.68
60 (Research)	.28	.22	.96
61 (Outside Resources)	.36	.24	.97
62 (Effective Lab. Use)	.40	.23	.85
63 (Add. Lab. Space)	.23	.07	.77
64 (Add. Lab. Equip.)	.28	.12	1.07

TABLE 4.15

Distributions of Responses to Section IV Items for the Level B Group of the Sample

Item	A	C	C/B
42 (Indv.)	.63	.23	.87
43 (Slow)	.50	.11	.68
44 (Able)	.62	.45	.99
45 (Induct.)	.58	.36	.96
46 (Active Invol.)	.65	.30	.87
47 (Motivate)	.57	.13	.62
48 (Non-college)	.36	.08	.77
49 (Self-paced)	.35	.11	.86
50 (Computers)	.26	.16	.81
51 (Comp. Asst. Inst.)	.19	.12	.90
52 (Up-Date)	.67	.65	1.01
53 (Curr. Dev.)	.44	.33	.87
54 (Interdiscp.)	.32	.12	.93
55 (Fusing)	.33	.18	.95
56 (In-depth)	.65	.64	.96
57 (Refresh.)	.51	.52	.99
58 (Allied Subs.)	.45	.36	.97
59 (Local)	.18	.07	.92
60 (Research)	.24	.19	.99
61 (Outside Resources)	.29	.14	1.02
62 (Effective Lab. Use)	.36	.18	.84
63 (Add. Lab. Space)	.23	.05	.81
64 (Add. Lab. Equip.)	.28	.09	.90

TABLE 4.16

Distributions of Responses to Section IV Items for the Unitary Group of the Sample

Item	A	C	C/B
42 (Indv.)	.63	.25	.87
43 (Slow)	.52	.14	.64
44 (Able)	.56	.40	.98
45 (Induct.)	.60	.40	.88
46 (Active Invol.)	.68	.38	.84
47 (Motivate)	.58	.17	.61
48 (Non-college)	.34	.08	.73
49 (Self-paced)	.39	.12	.83
50 (Computers)	.16	.06	.76
51 (Comp. Asst. Inst.)	.14	.06	.81
52 (Up-Date)	.67	.60	1.00
53 (Curr. Dev.)	.45	.35	.91
54 (Interdiscp.)	.32	.13	.84
55 (Fusing)	.30	.16	.92
56 (In-depth)	.48	.42	.92
57 (Refresh.)	.52	.51	1.01
58 (Allied Subs.)	.45	.34	.98
59 (Local)	.24	.11	.87
60 (Research)	.25	.21	1.04
61 (Outside Resources)	.33	.22	1.04
62 (Effective Lab. Use)	.40	.26	.95
63 (Add. Lab. Space)	.23	.07	.82
64 (Add. Lab. Equip.)	.30	.12	.99

TABLE 4.17

Distributions of Responses to Section IV Items for the Sequential Group of the Sample

Item	A	C	C/B
42 (Indv.)	.64	.24	.85
43 (Slow)	.50	.10	.64
44 (Able)	.60	.44	1.00
45 (Induct.)	.60	.34	.91
46 (Active Invol.)	.65	.29	.86
47 (Motivate)	.56	.14	.65
48 (Non-college)	.36	.08	.64
49 (Self-paced)	.35	.11	.74
50 (Computers)	.25	.13	.78
51 (Comp. Asst. Inst.)	.18	.09	.81
52 (Up-Date)	.66	.66	1.01
53 (Curr. Dev.)	.46	.35	.88
54 (Interdiscp.)	.32	.13	.93
55 (Fusing)	.35	.21	1.03
56 (In-depth)	.68	.70	.98
57 (Refresh.)	.54	.55	1.00
58 (Allied Subs.)	.47	.42	1.00
59 (Local)	.20	.05	.69
60 (Research)	.26	.10	.84
61 (Outside Resources)	.31	.15	.95
62 (Effective Lab. Use)	.37	.17	.77
63 (Add. Lab. Space)	.25	.05	.78
64 (Add. Lab. Equip.)	.29	.09	.98

TABLE 4.18

Distributions of Responses to Section IV Items for the Social Science Group of the Census

Item	A	C	C/B
42 (Indv.)	.66	.36	.93
43 (Slow)	.44	.16	.83
44 (Able)	.48	.42	1.16
45 (Induct.)	.63	.48	.93
46 (Active Invol.)	.73	.57	.97
47 (Motivate)	.55	.27	.92
48 (Non-college)	.29	.11	.73
49 (Self-paced)	.36	.13	.65
50 (Computers)	.09	.04	.94
51 (Comp. Asst. Inst.)	.10	.05	1.57
52 (Up-date)	.68	.69	1.02
53 (Curr. Dev.)	.51	.47	.97
54 (Interdiscp.)	.32	.21	.95
55 (Fusing)	.12	.11	1.05
56 (In-depth)	.43	.41	.98
57 (Refresh.)	.51	.55	1.03
58 (Allied Subs.)	.53	.55	1.13
59 (Local)	.25	.14	.97
60 (Research)	.30	.31	1.07
61 (Outside Resources)	.45	.36	1.09
62 (Effective Lab. Use)	.26	.18	1.01
63 (Add. Lab. Space)	.15	.07	1.04
64 (Add. Lab. Equip.)	.20	.10	1.03

TABLE 4.19

Distributions of Responses to Section IV Items for the Supervisors Group of the Census

Item	A	C	C/B
42 (Indv.)	.66	.40	1.15
43 (Slow)	.50	.34	1.21
44 (Able)	.58	.39	.96
45 (Induct.)	.66	.49	1.26
46 (Active Invol.)	.67	.48	1.06
47 (Motivate)	.58	.28	.97
48 (Non-college)	.44	.27	1.00
49 (Self-paced)	.42	.25	1.07
50 (Computers)	.47	.47	.92
51 (Comp. Asst. Inst.)	.33	.35	.89
52 (Up-date)	.58	.36	.88
53 (Curr. Dev.)	.69	.61	1.00
54 (Interdisep.)	.43	.22	1.08
55 (Fusing)	.36	.16	1.12
56 (In-depth)	.41	.16	.73
57 (Refresh.)	.40	.19	.96
58 (Allied Subs.)	.41	.24	1.08
59 (Local)	.29	.14	.94
60 (Research)	.20	.11	1.44
61 (Outside Resources)	.35	.21	1.47
62 (Effective Lab. Use)	.35	.22	1.08
63 (Add. Lab. Space)	.31	.17	1.05
64 (Add. Lab. Equip.)	.29	.24	1.27

Comparisons of the Immediate Effects of Institute Attendance on Classroom Procedures

Section V, reproduced below, measured the effects of institute attendance on classroom practices. The items were combined into two subscales. One subscale contained "feeling tone" items (Items 65-70, 80, 81, 83, 87-89); the second subscale contained "action" items (Items 71-79, 82, 84-86). The responses Negligible or none, Little, Moderately, Considerably, and A Great Deal were assigned numerical values 1-5 respectively. The score for each respondent on each subscale was the sum of the numerical values assigned to the items of the subscale. The group score on each subscale was the arithmetic mean of the respondents' scores in the respective subscale.

SECTION V

For each item check the one and only one response which best indicates the extent to which your participation in institute(s) has contributed to that result.

(THE DESIGNATION OF MATH/SCIENCE IN THF ITEMS DESIGNATES THE AREA(S) STUDIED BY YOU IN YOUR INSTITUTE (E.G., IF YOU STUDIED ECONOMICS IN THE INSTITUTE, THIS IS THE AREA UNDER CONSIDERATION). INTERPRET THE WORD LABORATORY IN THE BROAD SENSE TO COVER YOUR DISCIPLINE. ALL QUESTIONS CONCERNING YOUR CLASSROOM INSTRUCTION RELATE TO THE PERIOD BEGINNING FROM FALL 1970 TO THE PRESENT.

		NEGLIGIBLE OR NONE	LITTLE	MODERATELY	CONSIDERABLY	A GREAT DEAL
65	increased your math/science knowledge, directly related to the math/science you teach	—	—	—	—	—
66	increased your math/science knowledge	—	—	—	—	—
67	increased your professional competence in teaching math/science	—	—	—	—	—
68	increased confidence in your ability to present math/science	—	—	—	—	—
69	increased your ability to judge content for your classes	—	—	—	—	—
70	increased knowledge of new teaching techniques	—	—	—	—	—
71	led you to implement new teaching techniques in your classes	—	—	—	—	—
72	increased your stimulation of student interest in math/science	—	—	—	—	—
73	increased your effectiveness in classroom teaching	—	—	—	—	—
74	enabled you to teach units or content not previously taught by you in existing courses	—	—	—	—	—
75	led you to introduce new units and topics into existing courses	—	—	—	—	—
76	led you to introduce laboratory experiences into courses that previously contained none	—	—	—	—	—
77	led you to add additional laboratory demonstrations, techniques, or experiments to existing laboratory courses	—	—	—	—	—
78	led you to modify laboratory demonstrations, techniques, or experiments in existing laboratory courses	—	—	—	—	—
79	led you to delete portions of content previously included in your courses	—	—	—	—	—
80	increased your enthusiasm for teaching math/science	—	—	—	—	—
81	increased your ability to individualize the math/science instruction for your students	—	—	—	—	—
82	increased the individualization of math/science instruction for your students	—	—	—	—	—
83	increased your feeling of personal accomplishment in successfully having completed the institute	—	—	—	—	—
84	led you to increase your personal study of new math/science programs	—	—	—	—	—
85	led you to increase your membership in professional organizations	—	—	—	—	—
86	led you to increase your active participation in professional organizations	—	—	—	—	—
87	increased your influence on other math/science teachers in your school with respect to subject-matter competence	—	—	—	—	—
88	increased your influence on other math/science teachers in your school with respect to teaching techniques	—	—	—	—	—

89 increased your influence on other math/science teachers in your school with respect to implementing new curriculum

The distributions of responses to items for the eight major analysis groups are given in Table 4.20. The .95 confidence intervals are also given for the non-implementation group of the Sample (reference group).

TABLE 4.20

Distributions of Respondents to Section V Items for the Eight Major Groups

Group	Feeling Tone	Action
Non-implementation (Sample)	40.26 (39.76-40.76)	35.38 (34.85-35.91)
Implementation (Census)	41.50	39.61
Level A (Sample)	40.39	35.88
Level B (Sample)	40.16	34.99
Unitary (Sample)	39.56	35.74
Sequential (Sample)	41.12	35.63
Social science (Census)	38.33	36.64
Supervisors (Census)	42.78	39.51

It should be noted that the "feeling tone" subscale contains twelve items while the "action" subscale contains thirteen items. Since however, in all cases the "feeling tone" score is higher than the "action" score, it is safe to say that the institutes had a greater effect on the confidence, judgment etc., of the respondents than on the actions of introducing new materials, methods, etc. However, a glance at Table H 1 in Appendix H will show that the Mathematics institute participants were significantly lower than all other Sample subgroups on the "action" score; since mathematics

participants constituted 46 per cent of the Sample, the action score for the entire Sample is considerably depressed. It should be noted that the items relating to laboratory experiences may not have been perceived by Mathematics participants as being applicable to them therefore their "action" scores may not be comparable to other groups.

The Implementation, Sequential, and Supervisors groups were significantly higher in "feeling tone" scores than the reference group with the Supervisors group ranked highest of all. The Implementation, Social Science, and Supervisors groups were higher in "action" scores than the reference group with the Implementation group ranked highest of all. The Social Science group was the only group that was lower than the reference group in "feeling tone" score, while no group was lower than the reference group on the "action" score. Further distributions of responses to the item are given in Appendix H.

Table H 1 Disciplines of the Sample

Table H 2 Disciplines of the Census

Table H 3 Implementation Groups of the Census

CHAPTER V

ADDITIONAL ANALYSES FOR SELECTED GROUPS

In Chapter IV, tables of data were presented which showed basic comparisons of various institute groups with respect to response data obtained from Sections I, III, IV and V of the questionnaire. Chapter V is concerned with comparisons of major groups such as Census, Sample, implementation, and institute disciplines, with the data from Sections II, III, V, VI and VII, but does not attempt to compare all possible combinations of the data. In each case, one demographic feature was used to categorize the data from a specific section, e.g., the ratio of the number of classes taught to the institute discipline.

Impact of Implementation Institutes

One of the criteria used in designating the implementation institutes of the Census was that the institute content be centered on the implementation of a curriculum project. Section VII of the questionnaire was designed specifically for participants of such institutes. To facilitate the reader's reference to the original questions in Section VII, that page of the questionnaire has been included below. The right column includes the Section VII abbreviations that are used in Table 5.01.

SECTION VII

According to NSF records, you attended one of the institutes which was oriented towards one of the new curriculum projects. Please supply the following information about that particular institute.	Abbreviations of item designations shown in Table 5.01
102 How much of the institute was devoted to the project?	(Institute Treatment)
_____ 75 per cent or more	75%+
_____ 50 per cent - 75 per cent	50-75%
_____ less than 50 per cent	Under 50%

103	Has the curriculum project studied in the institute been implemented in your classroom?	(Extent of Implementation)
_____	Yes	Yes
_____	No, not the entire curriculum but substantial portions of materials, approaches, or ideas have been implemented.	Parts
_____	No, but it has been implemented in my school.	In the School - not class
_____	No, but there are plans to implement it in my classroom next year.	Plan to - class
_____	No, but there are plans to implement it in my school next year, but perhaps not in my classroom.	Plan to - school
_____	No, and at the time it looks as though we will not be adopting the curriculum project.	No Plans - school
_____	Other (please explain)	Other
104	If your school has implemented the curriculum project, when was it introduced?	(Dates of Implementation)
_____	1968-1969 or earlier	68-69 or earlier
_____	1969-1970	69-70
_____	1970-1971	70-71
_____	1971-1972	71-72
105	What was your main objective for selecting this particular institute? Check only one response.	(Reason for Attendance)
_____	I had not yet taught in the curriculum project but was expected to do so in the future.	Expected to teach it
_____	I had been teaching in the curriculum project without formal background in it.	Already teaching it
_____	I wanted to obtain information which would help in deciding the suitability of the curriculum project for adoption in our school.	Help decide on adoption
_____	I needed the background necessary for leadership in our school system.	Background to lead implementation
_____	Other specify:	Other

The number of responses in each category for the items of Section VII are shown in Table 5.01. These items are indicated by their numbers in the questionnaire. The tabulations are categorized according to the curriculum project emphasized in the institute. These data represent the relative impact of the implementation institutes of the Census on subsequent implementation of curricula in schools.

TABLE 5.01

Participants' Responses to Section VII Items for Implementation Institutes of the Census Group

Item Number and Designation	Curriculum Project Emphasized*							
	ECCP	ESCP	ISCS	IPS	HPP	UICSM	SRSS	Total
Number of Responses	117	316	79	285	371	320	119	1607
102 (Institute Treatment)								
75%+	104	156	67	227	343	288	51	1236
50-75%	9	90	11	19	25	21	23	198
Under 50%	2	61	0	4	1	4	42	114
No Response	2	9	1	35	2	7	3	59
103 (Extent of Implementation)								
Yes	27	148	50	138	185	144	39	731
Parts	27	96	6	46	89	78	47	389
In the School - not class	4	5		11	9	8	1	38
Plan to - class	3	5	2	4	6	3	4	27
Plan to - school	3	3	1	1	3	0	1	12
No Plans - school	32	33	13	33	38	52	9	210
Other	18	13	6	17	30	28	12	124
No Response	3	13	1	35	11	7	6	76
104 (Dates of Implementation)								
68-69 or earlier	9	66	1	65	27	30	--	198
69-70	8	46	10	25	30	23	7	149
70-71	16	66	28	60	115	116	47	448
71-72	5	13	15	18	58	12	11	132
No Response	79	125	25	117	141	139	54	680
105 (Reason for Attendance)								
Expected to teach	19	76	18	61	72	82	21	349
Already teaching it	4	72	8	45	23	15	16	183
Help decide on adoption	55	64	34	75	166	128	37	559
Background to lead implementation	14	35	9	24	62	38	24	206
Other	19	53	9	40	36	52	16	227
No Response	6	16	1	40	10	5	5	83

* See page 28 of Chapter Three for complete titles of curriculum projects.

Considering the total group of implementation institutes in the Census the following may be concluded:

1. The institutes stressed the projects with which they were identified.

2. Two-thirds of the participants were using at least part of the project stressed at the institute.

3. Fifty per cent of the participants had converted to the respective curriculum project by the end of the 1970-71 school year. An additional, eight per cent of the participants were involved in the implementation of the project during the 1971-72 school year.[2]

4. The number of participants who attended institutes for the purpose of attaining information relative to curriculum project adoption decisions was roughly equivalent to the number who were preparing to or had been teaching the project.

In comparing the implementation institutes, the data of Table 5.01 reveal the following general observation.

1. Most of the participants in the ECCP, ISCS, UICSM, and HPP institutes reported that 75 per cent or more of the institute time was devoted to the project. ESCP institutes tended to concentrate less on implementation of the ESCP project and more on other topics than other implementation institutes.

2. Considering Item 103, participants in the ISCS institutes showed the largest proportion incorporating the entire project in their curricula (50 our of 79). All projects except ECCP had a large group of participants (between two-thirds and three-fourths) who had adopted the project either totally or partially. In the ECCP institutes, however, only about one-fourth adopted the entire program, an equal number did so partially, and another one-fourth did not respond positively about adoption plans at the time the survey was made. No general conclusions about ECCP implementation could be drawn from these responses, because the commercial version of the text did not become available until May, 1971, which left too little time for action to become effective by September of 1971. This publication gap undoubtedly affected the responses.

3. About one-third of the participants in ESCP and IPS institutes reported that their schools had already adopted these projects before the summer of 1970. Less than one sixth of the participants had implemented ISCS prior to attending the institute. The latter may be

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[2]Item 104 was directed toward those who indicated in Item 103 that they had implemented the respective programs in their schools or classrooms. This explains the relatively high non-response rate on Item 104.

explained in part by the fact that the ISCS program was not available commercially until the fall of 1970.

4. In interpreting the data from Item 105 of the questionnaire on "Reason for Attendance", it should be noted that one third or more of the participants in ESCP, IPS and UICSM institutes had either used the project materials or expected to use the program the following fall. Nearly one half of the participants in the ECCP, ISCS and HPP institutes attended to help them decide on the suitability of the curriculum project for their schools.

5. The participants in the SRSS institutes had a high rate of implementation (nearly three fourths) when both total and partial adoption was considered. They tended to resort more to partial adoption than did participants of other project institutes. This partial adoption was consistent with the types of materials offered by the SRSS project.

An analysis was made to determine the relationship between the type of implementation institute attended (Questionnaire Item 101) and the enrollment per grade of the school in which the participant taught. No discernible trends were found.

Classification of Teaching Assignment by the Discipline of the Institute

One matter of concern was the extent to which a participant's subsequent teaching assignment was related to the discipline of the institute attended. The point of consideration was the extent to which the individual taught the discipline studied at the institute. The measure computed was the ratio of number of classes taught in a subject to the number of participants indicating that they taught that subject. The ratio is presented (Tables 5.02-5.08) both in terms of the actual number and its corresponding decimal value. The participants were categorized according to the type of institute attended. Tables 5.02, 5.07 and 5.08 include responses from participants of more than one institute discipline. Tables 5.03 through 5.06 contain data from participants of both the Census and Sample. Table 5.02 contains data only from participants in the Sample, while Tables 5.07 and 5.08 contain data from participants of the Census group.

To help interpret these tables, consider two examples selected from Table 5.05: participants that attended Mathematics institutes. There were 574 respondents in the Sample and among them 527 indicated that they taught mathematics. The number of mathematics classes taught by these 527 respondents was 2,371 giving a ratio of 4.5 classes per respondent. In another example, fifteen of the respondents indicated they taught a total of 19 physics classes for a ratio of 1.3 physics classes per respondent. In a similar manner, the table shows other subjects taught by participants of Mathematics institutes and the ratio of classes per respondent for each subject.

The same procedure was used for Tables 5.02 through 5.08 to determine the various subjects taught and the ratio of classes per respondent for participants attending different types of institutes in the Census and Sample. A general observation of the data indicates that the SI participants were given teaching assignments in a wide variety of subjects even though they attended institutes concentrating on a single curriculum project.

TABLE 5.02

Ratio of the Number of Classes Taught in Each Subject to the Number of Participants Teaching Each Subject in the Biology, Chemistry, and Multiple Fields Institutes of the Sample

Teaching Assignment	Institute Discipline		
	Biology	Chemistry	Multiple Fields
Number of Respondents	213	100	292
Anthropology			5/1 (5.0)
History	2/2 (1.0)		2/1 (2.0)
Social Studies	10/4 (2.5)		8/3 (2.7)
Sociology			
Geography	5/2 (2.5)		1/1 (1.0)
Economics			
Psychology	2/2 (1.0)		
Mathematics	128/34 (3.8)	26/10 (2.6)	306/77 (4.0)
Physics	8/3 (2.7)	68/34 (2.0)	141/86 (1.6)
General Science	169/47 (3.6)	29/10 (2.9)	166/58 (2.9)
Earth Science	53/21 (2.5)	12/6 (2.0)	54/22 (2.4)
Chemistry	18/11 (1.6)	249/76 (3.3)	259/101(2.6)
Biology	552/149(3.7)	27/13 (2.1)	191/67 (2.9)
Integrated Phy. Sci.	24/12 (2.0)	22/10 (2.2)	150/52 (2.9)
Other	50/25 (2.0)	18/11 (1.8)	81/42 (1.9)

TABLE 5.03

Ratio of the Number of Classes Taught in Each Subject to the Number of Participants Teaching Each Subject in the Earth Science Institutes of the Sample and Census

Teaching Assignment	Sample	Census
Number of Respondents	55	791
Anthropology		6/4 (1.5)
History	3/2 (1.5)	18/10 (1.8)
Social Studies		30/14 (2.1)
Sociology		1/1 (1.0)
Geography		40/17 (2.4)
Economics		
Psychology		3/2 (1.5)
Mathematics	19/7 (2.7)	206/92 (2.2)
Physics	3/3 (1.0)	84/49 (1.7)
General Science	48/14 (3.4)	758/231 (3.3)
Earth Science	103/31 (3.3)	1656/510 (3.3)
Chemistry	12/5 (2.4)	140/69 (2.0)
Biology	36/13 (2.8)	473/184 (2.6)
Integrated Phy. Sci.	9/5 (1.8)	263/103 (2.6)
Other	24/11 (2.2)	212/99 (2.1)

TABLE 5.04

Ratio of the Number of Classes Taught in Each Subject to the Number of Participants Teaching Each Subject in the General Science Institutes of the Sample and Census

Teaching Assignment	Sample	Census
Number of Respondents	29	844
Anthropology		7/4 (1.8)
History	1/1 (1.0)	93/38 (2.5)
Social Studies		81/39 (2.1)
Sociology		38/18 (2.1)
Geography		36/18 (2.0)
Economics		22/9 (2.4)
Psychology		13/8 (1.6)
Mathematics	30/9 (3.3)	333/127 (2.6)
Physics	4/2 (2.0)	140/78 (1.8)
General Science	57/15 (3.8)	1308/365 (3.6)
Earth Science	9/3 (3.0)	385/149 (2.6)
Chemistry	5/3 (1.7)	143/83 (1.7)
Biology	20/7 (2.9)	435/165 (2.6)
Integrated Phy. Sci.	20/7 (2.9)	667/212 (3.2)
Other	3/3 (1.0)	473/153 (3.1)

TABLE 5.05

Ratio of the Number of Classes Taught in Each Subject to the Number of Participants Teaching Each Subject in the Mathematics Institutes of the Sample and Census

Teaching Assignment	Sample		Census*	
Number of Respondents	574		320	
Anthropology			1/1	(1.0)
History	19/12	(1.6)	18/8	(2.3)
Social Studies	61/18	(3.4)	63/14	(4.5)
Sociology				
Geography	14/6	(2.3)	2/2	(1.0)
Economics	4/3	(1.3)	3/2	(1.5)
Psychology				
Mathematics	2371/527	(4.5)	1298/295	(4.4)
Physics	19/15	(1.3)	2/1	(2.0)
General Science	39/21	(1.9)	39/17	(2.3)
Earth Science	12/6	(2.0)	8/5	(1.6)
Chemistry	19/15	(1.3)	2/1	(2.0)
Biology	80/23	(3.5)	14/6	(2.3)
Integrated Phy. Sci.	12/8	(1.5)	5/2	(2.5)
Other	105/54	(1.9)	87/33	(2.6)

*In the Census all Mathematics institutes were concerned with UICSM, a junior high mathematics course.

TABLE 5.06

Ratio of the Number of Classes Taught in Each Subject to the Number of Participants Teaching Each Subject in the Physics Institutes of the Sample and Census

Teaching Assignment	Sample	Census*
Number of Respondents	94	371
Anthropology		
History	2/1 (2.0)	
Social Studies		3/1 (3.0)
Sociology		9/2 (4.5)
Geography		2/1 (2.0)
Economics		2/1 (2.0)
Psychology		3/2 (1.5)
Mathematics	66/25 (2.6)	285/103 (2.8)
Physics	92/48 (1.9)	686/300 (2.3)
General Science	32/15 (2.1)	125/59 (2.1)
Earth Science	42/13 (3.2)	35/20 (1.8)
Chemistry	103/40 (2.6)	214/94 (2.3)
Biology	18/7 (2.6)	45/28 (1.6)
Integrated Phy. Sci.	38/16 (2.4)	170/77 (2.2)
Other	46/19 (2.4)	150/74 (2.0)

*In the Census all Physics Institutes were concerned with the implementation of Harvard Project Physics, a senior high school physics course.

TABLE 5.07

Ratio of the Number of Classes Taught in Each Subject to the Number of Participants Teaching Each Subject in the Social Science Institutes of the Census

Teaching Assignment	Institute Discipline: Economics		Geography		Psychology		Sociology	
Number of Respondents	217		65		66		178	
Anthropology	20/8	(2.5)	7/3	(2.3)	5/4	(1.3)	17/9	(1.9)
History	282/93	(3.0)	48/18	(2.7)	20/12	(1.7)	274/94	(2.9)
Social Studies	187/59	(3.2)	25/8	(3.1)	20/8	(2.5)	173/64	(2.7)
Sociology	37/19	(2.0)	4/1	(4.0)	37/14	(2.6)	143/78	(1.9)
Geography	50/20	(2.5)	53/22	(2.4)	2/1	(2.0)	86/35	(2.5)
Economics	266/134	(2.0)	1/1	(1.0)	3/2	(1.5)	50/25	(2.0)
Psychology	24/12	(2.0)			95/31	(3.1)	35/17	(2.1)
Mathematics	14/6	(2.3)	21/10	(2.1)	5/1	(5.0)	2/1	(2.0)
Physics					2/2	(1.0)		
General Science			70/22	(1.8)	12/4	(3.0)	3/1	(3.0)
Earth Science			7/4	(3.2)	10/4	(2.5)		
Chemistry					7/4	(1.8)	2/1	(2.0)
Biology			18/6	(3.0)	73/18	(4.1)	12/4	(3.0)
Integrated Phy. Sci.	2/1	(2.0)	25/6	(4.2)				
Other	130/44	(2.7)	36/11	(3.3)	24/12	(2.0)	59/22	(2.7)

TABLE 5.08

Ratio of the Number of Classes Taught in Each Subject to the Number of Participants Teaching Each Subject in the ECCP and Supervisors Institutes of the Census

Teaching Assignment	Institutes	
	ECCP	Supervisors
Number of Respondents	117	118
Anthropology	5/2 (2.5)	
History		
Social Studies	15/5 (3.0)	18/4 (4.5)
Sociology		
Geography		
Economics		
Psychology	1/1 (1.0)	
Mathematics	99/32 (3.0)	235/54 (4.4)
Physics	90/44 (2.1)	22/10 (2.2)
General Science	37/17 (2.2)	25/9 (2.8)
Earth Science	12/5 (2.4)	7/2 (3.5)
Chemistry	93/36 (2.6)	31/8 (3.9)
Biology	66/21 (3.1)	26/9 (2.9)
Integrated Phy. Sci.	27/11 (2.5)	20/7 (2.9)
Other	94/41 (2.3)	23/13 (1.8)

Detailed analyses of the data in Tables 5.02 through 5.08 for specific types of institutes reveal among other findings the following observations.

Biology Institutes (Table 5.02). Of the 213 respondents who attended Biology Institutes 149 actually taught Biology. Their average Biology class load was 3.7. The second most common teaching assignment was General Science (47 respondents) for which the average class load was 3.6. It was interesting to note that 34 respondents taught Mathematics with an average class load of 3.8 classes. Evidence indicates that some of these teachers had Mathematics and General Science as their major teaching assignment.

Chemistry Institutes (Table 5.02). More than three fourths of the respondents who attended Chemistry institutes taught Chemistry as part of their teaching load. They taught an average of 3.3 Chemistry classes. About one third of the respondents taught Physics making it the second most common subject in their teaching assignments. Note that no respondent indicated teaching any of the Social Sciences.

Multiple Fields Institutes (Table 5.02). Of the 292 respondents from Multiple Fields institutes more than one third were assigned to teach some Chemistry, about one third were assigned to teach some Physics and about one fourth taught some Mathematics.

Earth Science Institutes (Table 5.03). The respondents of the Sample and Census were similar in that the subject most commonly included in their teaching assignments was Earth Science, followed by General Science and Biology. Several Respondents were teaching Social Science courses.

General Science Institutes (Table 5.04). Respondents from General Science institutes had, as a group, varied teaching assignments that included all of the listed subject areas. Even so, over forty per cent of the respondents were assigned to General Science classes. The second most common assignment was Integrated Physical Science which also had the second highest average class load. Several respondents were teaching Social Science courses as well as "other" courses.

Mathematics Institutes (Table 5.05). Almost all respondents from Mathematics institutes were assigned to teach Mathematics classes. Their Mathematics class loads averaged 4.5 classes in the Sample and 4.4 classes in the Census. This left little room for teaching assignments outside of Mathematics as indicated by the data. It should be noted, however, that a distortion was built into the subject area classification. Mathematics was compared to individual Science and Social Science disciplines rather than to the whole of Science and of Social Science.

Physics Institutes (Table 5.06). In both the Sample and Census a majority of the respondents were assigned to teach some Physics classes, but the average class loads in Physics were low (1.9 in the Sample and 2.3 in the Census). In the Sample the second most common teaching

assignment was Chemistry followed by Mathematics while in the Census the second most common assignment was Mathematics followed by Chemistry. It should be noted that the Physics institutes used in the Census stressed the HPP project. The number of participants in HPP institutes teaching Physics classes was proportionately much larger than those participants in non-implementation Physics institutes of the Sample.

Social Science Institutes (Table 5.07). The data of Table 5.07 indicates that most teachers did not teach classes in the discipline studied in the SIs and that they tended to teach in a variety of other subject areas in addition to Social Science including Science and Mathematics courses.

ECCP Institutes (Table 5.08). Approximately one-third of the respondents reported that their teaching assignments included Physics. Large numbers of respondents were also teaching Mathematics and Chemistry courses. An equally large number of respondents was teaching "other" courses which may be partially explained by the omission of ECCP, or any discipline equivalent for that course, being listed as one of the areas of teaching assignment.

Supervisors Institutes (Table 5.08). The sum of the denominators of the ratios is less than the total number of respondents therefore some supervisors did not teach any classes. More than one-half of the classes taught by supervisors were in Mathematics.

In order to make simple comparisons between the Sample and the Census, some data from Tables 5.03-5.06 were combined in Table 5.09. The four subject areas selected for Table 5.09 were Earth Science, General Science, Mathematics, and Physics. These subject areas had institutes in both the Sample and the Census. In each case the ratio used was the average number of classes taught in a subject area by a teacher who attended an institute in that same subject area (e.g., the average number of general science classes taught by a participant in a General Science institute). Ninety-five per cent confidence intervals were computed for the Sample averages.

TABLE 5.09

Average Number of Classes Taught in a Given Subject Area by a Participant in a SI of That Same Subject for Earth Science, General Science, Mathematics, and Physics Institutes

Institute	Sample	.95 Confidence Interval	Census
Earth Science	3.32	(2.80 - 3.84)	3.25
General Science	3.80	(3.24 - 4.36)	3.58
Mathematics	4.50	(4.38 - 4.62)	4.40
Physics	1.92	(1.65 - 2.19)	2.29

Only in the Physics institutes of the Census, is the average number of classes taught outside the .95 confidence interval for the Sample average. It should be noted that the Physics Institutes in the Census stressed the HPF project.

Direct and Indirect Effects of Institute Attendance Upon Classroom Instruction and Supervisory Responsibilities

The data obtained from Section V of the questionnaire dealt with institute effects upon the participant's subsequent classroom and supervisory responsibilities. As described in Chapter III, the 25 items of Section V were divided into two groups, one reflecting the participant's subjective evaluation of the effects of the institute upon his teaching methods (feeling tone, 12 items) and the other group reflecting more concrete changes in his teaching (action, 13 items). The participants responded by checking one of five possible responses to each item. The responses were Negligible or None, Little, Moderately, Considerably, and A Great Deal and were weighted from 1 to 5 respectively. Thus, the greater the mean score, the greater the perceived effect of the

institute. The mean scores for each of these two groups of items for the Sample and Census are shown in Table 5.10. They are categorized according to the average school enrollment per grade in which the participant was teaching during the 1970-71 academic year.

TABLE 5.10

Mean Scores for Feeling Tone and Action Items by Average Grade Enrollment for the Sample and Census

Average Grade Enrollment	Sample		Census	
	Feeling Tone	Action	Feeling Tone	Action
No response	37.92	30.58	33.56	31.95
0-99	40.11	35.04	41.18	39.93
100-199	39.84	35.90	41.80	40.48
200-299	40.44	35.53	41.72	38.79
300-399	40.47	35.98	42.14	39.55
400-499	39.61	35.86	42.10	39.78
500-599	41.67	35.83	40.33	38.39
600-699	41.35	36.19	39.87	38.19
700-799	40.73	35.69	40.21	39.21
800-899	38.70	33.78	41.27	39.53
900+	41.27	36.35	41.00	39.39

Inspection of Table 5.10 reveals consistent results for all grade enrollment categories within each column for Feeling Tone and Action items. The only enrollment group which had noticeably lower averages in all four categories of items was the group of respondents which neglected to indicate the school class enrollment per grade. The higher Action scores in the

Census data when compared to the Sample data are basically consistent with the results in Table 4.20 of Chapter IV.

The numbers of teachers by average grade enrollment for the Sample and the Census are shown in Table 5.11. This same distribution of teachers applies to the average grade enrollment data in Tables 5.10 and 5.12.

TABLE 5.11

Numbers of Teachers by Average Grade Enrollment in Schools for the Sample and Census

Average Grade Enrollment	Sample	Census
No Response	26	72
0-99	229	423
100-199	216	490
200-299	202	405
300-399	166	424
400-499	150	332
500-599	86	204
600-699	75	159
700-799	45	106
800-899	37	86
900+	157	386
Total	1389	3087

An observation of the data in Table 5.11 reveals that in the Sample the largest number of teachers was in the 0-99 average grade enrollment category while in the Census the largest number of teachers was in the 100-199 average grade enrollment category. More than one half of the

teachers in both the Sample and Census were teaching in schools in which the average grade enrollments were below 400.

Section III of the questionnaire dealt with changes in professional duties and status directly attributable to participation in the 1970 SI. One of these changes was "moved to another school." The percentages of participants who moved (directly attributable to institute participation) are presented in Table 5.12.

TABLE 5.12

Percentages of Participants Who Moved to Another School by Average Grade Enrollment for the Sample and Census

Average Grade Enrollment	Sample	Census
No Response	.20	.17
0-99	.15	.16
100-199	.15	.13
200-299	.11	.15
300-399	.15	.13
400-499	.14	.20
500-599	.12	.19
600-699	.09	.15
700-799	.20	.19
800-899	.22	.16
900+	.24	.11

It may be noted from the results of Table 5.12 that the range of movement (.09 to .24) is substantial, but that the higher percentages are found in the Sample schools with enrollments 800 and above and in the Census

schools with enrollments between 400-599 and 700-799. The percentages of school transfers for the Census participants are less variable than those of the Sample. In the Census the smallest percentage of participant movement was found in the largest school enrollment per grade category, whereas in the Sample, the largest percentage of participant movement was found in this category.

The participants were questioned about their involvement in supervisory or administrative work during the 1970-71 academic year. Two statements were included and the possible responses in each class were Yes and No. Some respondents failed to give a response. The statements were:

> In addition to teaching during 1970-71, I had supervisory, advisory, or administrative responsibilities.
>
> I had no teaching assignment, but served as a supervisor or in an advisory capacity.

The numbers of responses to these statements are provided for various institutes in Table 5.13.

TABLE 5.13

Numbers of Responses to Statements Dealing with Supervisory, Advisory, or Administrative Responsibilities for Selected Institute Groups

	Had Teaching as well as Supervisory, etc., Responsibilities			Supervisory, etc., Responsibilities Only (No Teaching Assignment)		
Group	Yes	No	No Response	Yes	No	No Response
Sample	486	802	119	9	837	543
Census	1151	1659	227	85	1699	1303
Implementation Institutes of Census	665	905	155	50	935	740
Non-Implementation Institutes of Census	486	754	122	35	764	563

An inspection of Table 5.13 reveals that approximately one-third of the respondents in any group had supervisory, advisory, or administrative responsibilities during the 1970-71 academic year. The extent of these responsibilities was not defined, however, there were very few Yes responses to the statement regarding full-time supervisory, advisory, or administrative responsibilities. The Sample had fewer than 1 per cent of the participants responding Yes to the statements regarding full-time supervisory or administrative duties. The remaining three groups had approximately 3 per cent of the participants responding Yes. Thus, it appears that institute participants tended to remain in classroom teaching and even though they may have assumed supervisory and administrative duties only in rare instances were such responsibilities full-time.

Section V of the questionnaire had an item (Item 90) that was directed only to supervisors. It referred to "the extent to which your institute training has been used to supervise the math/science programs in your school." The five possible responses ranged from Negligible to A Great Deal and were scored 1 to 5 in that order. The number of responses for the categories of this item and the mean responses using the 1-5 weighting are presented in Table 4.15. The data indicate that participants of all groups, even those not in Supervisors institutes found the training useful in their supervisory work. The mean response for the Supervisors institutes was 4.31 and fell between Considerable and A Great Deal. The mean responses for the Sample and Census were 3.38 and 3.50 respectively and fell between Moderate and Considerable. Thus it appears that the training in Supervisors institutes did meet the objective of providing training useful in subsequent supervisory work. Apparently the training in the non-supervisors institutes also proves useful to participants who serve as supervisors.

TABLE 5.14

Responses of Participants Who Were Primarily Supervisors to Item 90: Usefulness of Institute Training for Subsequent Supervisory Work

Group	Response					
	Negligible	Little	Moderate	Considerable	A Great Deal	Mean of Weighted Response
Weight	1	2	3	4	5	
Supervisor Institutes	2	2	8	20	40	4.31
Sample	11	24	55	47	31	3.38
Census	24	69	113	151	97	3.50

Previous Institute Attendance

Responses to the items in Section II of the questionnaire yielded data on the frequency of institute participation prior to 1970. Tables 5.15 and 5.16 summarize the number of respondents who indicated they had previously participated in Academic Year, In-Service, Summer, Cooperative College-School Science, and other NSF programs. The classification Other indicates the total responses from Items 29, 30, and 32 of the questionnaire which included summer conferences, research participation, and other NSF fellowship or traineeship programs for secondary school teachers. The data in these two tables have been arranged to allow comparisons between the various disciplines.

TABLE 5.15

Numbers and Proportions of Participants with Previous Institute Participation by Institute Discipline and Type for the Sample

NSF Programs	Institute Discipline* BZ	CH	EZ	MA	PY	XX
Total Respondents	213	100	55	574	94	292
Academic Year	8 (.04)**	13 (.13)	6 (.11)	16 (.03)	4 (.04)	7 (.02)
In-Service	81 (.39)	56 (.58)	25 (.46)	187 (.33)	27 (.20)	141 (.49)
Summer	123 (.59)	65 (.67)	41 (.76)	317 (.56)	56 (.60)	183 (.63)
Cooperative College-School Science	3 (.01)	1 (.01)	3 (.06)	1 (.00)	4 (.04)	3 (.01)
Other	21 (.10)	14 (.14)	3 (.06)	33 (.06)	9 (.10)	8 (.03)

* See page 28, Chapter III, for the institute discipline names.

** This proportion indicates that .04 of the participants in Biology institutes in the Sample had previously attended an Academic Year Institute.

TABLE 5.16

Numbers and Proportions of Participants with Previous Institute Participation by Institute Discipline and Type for the Census

NSF Programs	Institute Discipline*									
	EN	EZ	GG	GS	MA	PS	PY	SE	SO	SU
Total Respondents	117	791	65	844	320	66	371	217	178	118
Academic Year	14 (.12)**	24 (.03)	3 (.05)	29 (.03)	21 (.07)	3 (.05)	51 (.14)	3 (.01)	1 (.01)	27 (.23)
In-Service	45 (.29)	238 (.30)	4 (.06)	159 (.19)	85 (.27)	9 (.14)	104 (.28)	6 (.04)	7 (.04)	40 (.34)
Summer	81 (.69)	484 (.61)	8 (.12)	431 (.51)	147 (.46)	40 (.61)	238 (.64)	75 (.35)	36 (.20)	89 (.75)
Cooperative College-School Science	7 (.06)	9 (.01)	0	3 (.00)	1 (.00)	6 (.09)	11 (.03)	0	0	7 (.06)
Other	13 (.11)	35 (.05)	1 (.02)	24 (.03)	13 (.04)	10 (.15)	41 (.11)	3 (.01)	1 (.01)	17 (.15)

*See page 28, Chapter III, for the institute discipline names.

**This proportion indicates that .12 of the participants in Engineering (ECCP) institutes in the Census had previously attended an Academic Year Institute.

The data in Tables 5.15 and 5.16 indicate that previous institute attendance by participants in both the Census and the Sample was predominately in Summer Institutes. In-Service Institutes were the second most previously attended programs. A larger proportion of Physics participants in the Census than those in the Sample had previously attended Academic Year Institutes. A larger proportion of Earth Science participants in the Sample than in the Census had previously attended Academic Year Institutes and In-Service institutes.

Excluding the areas of the Census which stressed relatively new NSF disciplines (the Social Sciences - GG, PS, SE and SO), it can be seen that the participants of the Supervisors and ECCP institutes showed the highest degrees of previous participation in institutes among all disciplines of the Census. Proportionately, the Earth Science and General Science institutes had fewer participants in the Census who had previously taken part in Academic Year Institutes. The General Science participants in the Census had a relatively low level of previous participation in NSF programs.

The overall extent of institute attendance of participants by sex and age for the Sample and Census respectively is shown in Tables 5.17 and 5.18. The previous institute attendance of participants was classified according to three levels. One level, None, was comprised of participants who had attended no previous institutes. Another level, Heavy, included those who had attended an Academic Year Institute and/or more than two previous Summer Institutes. The remaining level, Moderate, included all other patterns of previous participant attendance. The influence of the three year teaching requirement for institute attendance was verified by a larger number of the Under 30 age group in the None category and the Over 30 age group in the Heavy category of the Sample.

TABLE 5.17

Numbers of Participants with Previous NSF Program Attendance According to Sex Classified by Institute Discipline for the Age Categories Within Levels of Attendance for the Sample

Institute Discipline*	Sex	None				Moderate				Heavy			
		Under 30	30-39	Over 39	Total	Under 30	30-39	Over 39	Total	Under 30	30-39	Over 39	Total
BZ	M	26	20	6		22	28	22		0	18	8	
	F	6	9	7		15	5	9		3	4	2	
		32	29	13	74 (.35)**	37	33	31	101 (.48)	3	22	10	35 (.17)
CH	M	13	7	2		13	11	4		4	14	10	
	F	4	1	2		2	2	6		0	1	1	
		17	8	4	29 (.30)	15	13	10	38 (.39)	4	15	11	30 (.31)
EZ	M	7	1	0		7	8	6		0	6	5	
	F	3	3	2		2	1	2		0	0	1	
		10	4	2	16 (.30)	9	9	8	26 (.48)	0	6	6	12 (.22)
GS	M	4	3	2		2	4	1		0	2	0	
	F	1	3	1		2	2	1		1	0	0	
		5	6	3	14 (.48)	4	6	2	12 (.41)	1	2	0	3 (.10)
MA	M	71	48	29		69	89	31		8	37	18	
	F	37	10	17		37	20	25		2	8	11	
		108	58	46	212 (.37)	106	109	56	271 (.48)	10	45	29	84 (.15)
PY	M	15	6	4		17	13	8		4	10	7	
	F	1	0	0		2	1	3		0	3	0	
	T	16	6	4	26 (.27)	19	14	11	44 (.46)	4	13	7	24 (.26)
XX	M	32	22	7		46	43	29		9	18	10	
	F	9	6	11		9	16	10		2	5	6	
		41	28	18	87 (.30)	55	59	39	153 (.53)	11	23	16	50 (.17)
Totals		229 (.50)	139 (.30)	90 (.20)		245 (.38)	243 (.38)	157 (.24)		33 (.14)	126 (.53)	79 (.33)	

*See page 28, Chapter III for the institute discipline names.

**This proportion indicates that .35 of those participants attending Biology SI's in 1970 had no previous NSF Program attendance.

TABLE 5.18

Numbers of Participants with Previous NSF Program Attendance According to Sex Classified by Institute Discipline for the Age Categories Within Levels of Attendance for the Census

Institute Discipline*	Sex	Total				Moderate				Heavy			
		Under 30	30-39	Over 39	Total	Under 30	30-39	Over 39	Total	Under 30	30-39	Over 39	Total
EN	M	16	4	5		3	16	13		2	23	28	
	F	2	0	0		0	1	1		0	0	2	
		18	4	5	27 (.23)**	3	17	14	34 (.29)	2	23	30	55 (.48)
EZ	M	85	51	29		85	117	84		14	77	69	
	F	35	18	17		16	27	29		5	16	11	
		120	69	46	235 (.30)	101	144	113	358 (.46)	19	93	80	192 (.24)
GG	M	17	10	13		1	3	2		0	1	1	
	F	2	3	8		0	0	1		0	0	0	
		19	13	21	53 (.85)	1	3	3	7 (.11)	0	1	1	2 (.04)
GS	M	102	102	46		81	119	86		8	58	53	
	F	26	29	41		7	16	32		0	5	18	
		128	131	87	346 (.42)	88	135	118	341 (.41)	8	63	71	142 (.17)
MA	M	31	21	17		14	31	36		6	23	25	
	F	26	6	16		8	14	23		5	7	8	
		57	27	33	117 (.37)	22	45	59	126 (.40)	11	30	33	74 (.23)
PS	M	5	4	5		3	11	11		0	3	3	
	F	2	1	5		1	0	6		0	1	3	
		7	5	10	22 (.34)	4	11	17	32 (.05)	0	4	6	10 (.16)
PY	M	49	21	20		21	31	35		3	57	79	
	F	6	5	3		1	11	8		0	5	13	
		55	26	23	104 (.28)	22	42	43	107 (.29)	3	62	92	157 (.43)
SE	M	26	52	27		12	24	24		1	3	3	
	F	8	7	17		2	4	4		0	0	1	
		34	59	44	137 (.64)	14	28	28	70 (.33)	1	3	4	8 (.04)
SO	M	30	48	15		0	10	10		0	3	2	
	F	10	19	16		3	1	7		0	0	1	
		40	67	31	138 (.79)	3	11	17	31 (.18)	0	3	3	6 (.03)
SU	M	6	3	2		2	11	7		1	23	47	
	F	1	1	1		0	1	4		0	3	4	
		7	4	3	14 (.12)	2	12	11	25 (.21)	1	26	51	78 (.67)
Totals		485 (.41)	405 (.34)	303 (.25)		260 (.23)	448 (.40)	423 (.38)		45 (.06)	308 (.42)	371 (.51)	

*See page 28, Chapter III for the institute discipline names.

** This proportion indicates that .23 of those participants attending Engineering (ECCP) SI's in 1970 had no previous NSF Program attendance.

In comparing the institute involvement by discipline in both the Sample and Census (Tables 5.17 and 5.18) the General Science participants showed the highest percentage of teachers attending an institute for the first time. At the other extreme are the Chemistry participants in the Sample, who had the highest percentage of participants with heavy previous institute experience. In the Census, the participants in the ECCP and Supervisors institutes tended to have heavy previous attendance. Approximately one-third of all participants who attended SIs in 1970 from both the Census and the Sample had no previous institute experience. There is apparently a continuing residue of experienced Science and Mathematics teachers (at least three years of teaching experience are required for SI attendance) who are accepted at a SI for the first time in their teaching careers. Additional information from NSF records, not shown in this report, verifies that tendency over the years and into the present period.

Rankings of the Institute Objectives by Participants and Directors

Section VI of the questionnaire requested participants to do two rankings of NSF's objectives for institutes: one ranking as they perceived them at the time they submitted the application and another ranking to indicate how they felt the various objectives were met. A list of nine objectives had been established by NSF as a standard set which SIs were designed to meet. The directions pointed out that no institute was designed to meet all the objectives. The list of objectives was:

91. To update subject-matter knowledge of teachers who were once adequately prepared
92. To provide in-depth training to enable to meet new, higher standards (such as those represented by a master's degree)
93. To provide remedial study for those teachers who never had adequate training in the subject(s) they teach
94. To strengthen teachers' background in allied subjects pre-requisite to suitable mastery of a field

95. To acquaint teachers with new curriculum materials and teaching methods
96. To assist teachers in developing materials and courses adapted to individual teaching locales
97. To prepare teachers for assignments involving special problems (i.e., courses for slow learners, Advance Placement courses, etc.)
98. To provide research experience to contribute to understanding of science.
99. To develop leadership and supervisory potential (as by preparing teachers to teach their colleagues, or by training for supervisory assignments, etc.)
100. (Other objectives not included in the above list) Specify:

The institute directors also ranked the objectives for NSF first from the viewpoint of their original intentions and then from their interpretations of the actual outcomes of the institutes. Both the directors and participants ranked varying numbers of objectives (from 3 to 10). The results of the rankings required within institute comparisons rather than between institute comparisons. Therefore, ten institutes of various kinds were selected and the results are summarized in Tables 5.19 through 5.28. The selected institutes each had at least 90 per cent of the questionnaires returned with at least 90 per cent of the Section VI items completed.

TABLE 5.19

Per Cents of Participants Ranking Objectives First, Second or Third Compared With Their Director's Rankings Before and After a Unitary Biology Institute of the Sample

Objective	Ranking By Director		Ranking By Participants					
			First		Second		Third	
	Before	After	Before	After	Before	After	Before	After
91*	2	2	10.5	5.3	10.5	15.8	15.8	15.8
92					5.3	5.3	5.3	5.3
93				5.3	10.5		5.3	5.3
94							10.5	21.1
95	3	3	47.3	42.1	36.8	36.8	15.8	
96			5.3	10.5	10.5	5.3	10.5	15.8
97	1	1	31.6	31.6	15.8	21.1	10.5	5.3
98			5.3	5.3	5.3	10.5	5.3	
99					5.3			5.3
100								

* See page 96 for listing of objectives.

TABLE 5.20

Per Cents of Participants Ranking Objectives First, Second or Third Compared With Their Director's Ranking Before and After a Unitary Chemistry Institute of the Sample

Objective	Ranking by Director		Ranking By Participants First		Second		Third	
	Before	After	Before	After	Before	After	Before	After
91*	1	1		18.8	44.4	38.9	27.8	16.7
92	3	2		10.5	22.2	11.1	22.2	27.8
93							16.7	11.1
94			5.3		11.1	22.2		
95				10.5	22.2	5.6	16.7	22.2
96						5.6	11.1	
97	2	3	84.2	63.2		11.1		16.7
98					5.6	5.6		5.6
99								
100								

* See page 96 for listing of objectives.

TABLE 5.21

Per Cents of Participants Ranking Objectives First, Second or Third Compared With Their Director's Rankings Before and After a Sequential Mathematics Institute of the Sample

Objective	Ranking by Director		Ranking by Participants					
			First		Second		Third	
	Before	After	Before	After	Before	After	Before	After
91*	1	1	50.0	55.0	20.0	35.0	15.0	5.0
92	2	2	35.0	40.0	40.0	40.0	20.0	10.0
93			15.0	5.0	20.0	10.0	15.0	35.0
94					10.0	5.0	20.0	20.0
95	3	3					25.0	15.0
96					5.0			
97								
98								
99								
100								

* See page 96 for listing of objectives.

TABLE 5.22

Per Cents of Participants Ranking Objectives First, Second or Third Compared With Their Director's Rankings Before and After a Sequential Multiple Fields Institute of the Sample

Objective	Ranking by Director		Ranking by Participants: First		Second		Third	
	Before	After	Before	After	Before	After	Before	After
91*	3	3	19.0	19.0	33.3	9.5	23.8	38.1
92	1	1	61.9	52.3	23.8	23.8		4.8
93				4.8	4.8	14.3	33.3	23.8
94	2	2	19.0	23.8	38.1	27.3	19.0	9.5
95								
96								
97	4	4				4.8	9.5	4.8
98	5	5					14.3	9.5
99								
100								

* See page 96 for listing of objectives.

TABLE 5.23

Per Cents of Participants Ranking Objectives First, Second or Third Compared With Their Director's Rankings Before and After a Sequential Multiple Fields Institute of the Sample

Objective	Ranking By Director		Ranking by Participants					
			First		Second		Third	
	Before	After	Before	After	Before	After	Before	After
91*	3	4	45.0	45.0	20.0	20.0	5.0	15.0
92			30.0	30.0	20.0	20.0	15.0	15.0
93	1	2	10.0	10.0	15.0	15.0	10.0	15.0
94	2	3	10.0		10.0	25.0	25.0	15.0
95	6	8	5.0	5.0	20.0	5.0	40.0	10.0
96		1			5.0			
97		7						
98	4	5			10.0	10.0	5.0	10.0
99								
100	5	6						

* See page 96 for listing of objectives.

TABLE 5.24

Per Cents of Participants Ranking Objectives First, Second or Third Compared With Their Director's Rankings Before and After a Unitary Earth Science Institute of the Census

Objective	Ranking By Director		Ranking by Participants: First		Second		Third	
	Before	After	Before	After	Before	After	Before	After
91*			4.2	8.3	29.2	25.0	8.3	16.7
92			16.7	12.5	4.2	12.5	16.7	12.5
93		3	4.2	8.3	29.2	20.8	20.8	20.8
94			8.3	8.3	4.2	12.5	20.8	8.3
95	1	1	54.2	50.0	12.5	16.7	8.3	8.3
96			12.5	12.5	16.7	12.5	12.5	16.7
97							4.2	
98	2	2					4.2	4.2
99								
100								

* See page 96 for listing of objectives.

TABLE 5.25

Per Cents of Participants Ranking Objectives First, Second or Third Compared With Their Director's Rankings Before and After a Unitary General Science Institute of the Census

Objective	Ranking by Director		Ranking by Participants					
			First		Second		Third	
	Before	After	Before	After	Before	After	Before	After
91*	3	3	12.9	3.2	19.4	38.7	25.8	12.9
92				3.2	12.9	1.5	3.2	9.7
93	2	2	16.1	16.1	6.5	6.5	6.5	19.4
94				3.2	16.1	9.7	16.1	16.1
95	1	1	67.8	61.3	19.4	12.9	6.5	9.7
96					6.5	6.5	9.7	3.2
97				3.2			3.2	3.2
98				3.2	3.2			
99			3.2		3.2	3.2		
100				3.2			6.5	3.2

* See page 96 for listing of objectives.

TABLE 5.26

Per Cents of Participants Ranking Objectives First, Second or Third Compared With Their Director's Rankings Before and After a Unitary General Science Institute of the Census

Objective	Ranking By Director		Ranking by Participants					
			First		Second		Third	
	Before	After	Before	After	Before	After	Before	After
91*			26.5	35.3	23.5	11.8		5.9
92			11.8	8.8	8.8	8.8	11.8	11.8
93	1	1	20.6	23.5	8.8	11.6	14.7	8.8
94			8.8	8.8			5.9	
95	2	2	29.4	20.6	23.5	29.4	20.6	26.5
96	3	3			17.6	14.7	17.6	20.6
97						2.9	2.9	
98			2.9		8.8	5.9	2.9	8.8
99							2.9	2.9
100								

* See page 96 for listing of objectives.

TABLE 5.27

Per Cents of Participants Ranking Objectives First, Second or Third Compared With Their Director's Rankings Before and After a Sequential Earth Science Institute of the Census

Objective	Ranking by Director		Ranking by Participants					
			First		Second		Third	
	Before	After	Before	After	Before	After	Before	After
91*			8.0	4.0	24.0	16.0	12.0	16.0
92	1	1	72.0	76.0	12.0	8.0	12.0	12.0
93			4.0	12.0	24.0	20.0	20.0	16.0
94			12.0	4.0	16.0	28.0	24.0	16.0
95					12.0	8.0	8.0	12.0
96			4.0		4.0		4.0	
97						4.0	8.0	
98				4.0	4.0		4.0	12.0
99	2	2			4.0	4.0		
100						4.0		

* See page 96 for listing of objectives.

TABLE 5.28

Per Cents of Participants Ranking Objectives First, Second or Third Compared With Their Director's Rankings Before and After a Sequential Earth Science Institute of the Census

Objective	Ranking by Director		Ranking by Participants					
			First		Second		Third	
	Before	After	Before	After	Before	After	Before	After
91*			10.2	10.2	20.4	24.5	18.4	10.2
92	1	1	46.9	49.0	26.9	16.3	14.3	14.3
93	2	2	14.3	16.3	22.4	20.4	18.4	8.2
94			12.2	8.2	16.3	10.2	18.4	26.5
95	3	3	6.1		10.2	16.3	16.3	8.2
96							4.1	8.2
97								
98					2.0	4.1	6.1	8.2
99					2.0			2.0
100			4.1	4.1				

* See page 90 for listing of objectives.

Inspection of Tables 5.19 through 5.28 reveals a high agreement between the director's and the participants' rankings of the objectives for the following six institutes:

Biology, Unitary from the Sample (Table 5.19)

Mathematics, Sequential from the Sample (Table 5.21)

Multiple Fields, Sequential from the Sample (Table 5.22)

General Science Unitary from the Census (Table 5.25)

Earth Science Sequential from the Census (Table 5.27)

Earth Science Sequential from the Census (Table 5.28)

Four institutes have notable variations in the agreement between the director's and participants' rankings. These are described as follows.

Chemistry, Unitary from the Sample (Table 5.20): The institute achieved a variety of objectives, but what the participants perceived to be the main objective was not considered to be the main objective (before and after) by the director. The objective ranked number one by the director (before and after) was more commonly ranked second or third by the participant (before and after).

Multiple Fields, Sequential from the Sample (Table 5.23): The institute was designed to satisfy a variety of objectives and apparently was so perceived by the director and the participants, before and after the institute. A notable difference is that, after the institute, the director ranked a previously unranked objective as the most important objective. In contrast, after the institute, the participants' rankings completely excluded that objective.

Earth Science, Unitary from the Census (Table 5.24): There was a high agreement in the selection of the main objective of the program, but

the selection of the second most important objective by the director was not perceived by the participants as being important.

General Science, Unitary from the Census (Table 5.26): In considering the rankings without reference to the nature of the objectives, it might be concluded that a difference existed between the director's and the participants' determinations of the main objective of the institute. However, when the similarity between Objectives 1 and 3 is considered, it may be assumed that teachers might be inclined to view their remedial needs as updating needs.

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APPENDIX A

National Science Foundation 1970 Summer Institute
Participant Questionnaire

ED 073136

T: C02 380

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

October 5, 1971

Dear 1970 NSF Summer Institute Participant:

The National Science Foundation is conducting a national survey of the participants of 1970 Summer Institutes. The purpose of the survey is to evaluate the effects of institute attendance upon the participant and his subsequent professional performance. You have been selected as one of the respondents. Completion of the enclosed questionnaire will take a small amount of your time, but your responses are of great importance to NSF and the Summer Institute Program. Future directions for the Foundation's education programs will be influenced by the results of this evaluation.

We have engaged the University of Toledo, Center for Education Research as the contractor for this evaluation. University of Toledo staff, in cooperation with NSF officials, have designed the questionnaire. Therefore, all completed questionnaires are to be returned to the University of Toledo as indicated on the envelope. Please use the enclosed, stamped envelope for the prompt return of your completed questionnaire.

Please read the instructions carefully, since the format for response differs from section to section. The numbers in parentheses on the left side of each page are for information coding purposes; disregard those numbers as you respond to the items. The questionnaire number will be used only to exclude your name from follow-up mailings. You are guaranteed complete anonymity as an individual respondent.

Your cooperation in responding to the questionnaire and its prompt return are deeply appreciated.

Sincerely yours,

Charles A. Whitmer

Charles A. Whitmer
Division Director
Pre-College Education in Science

Enclosures

OMB No. 99-S 71004
Approval expires July 31, 1972

Survey Conducted By The University of Toledo
Center for Educational Research
under contract with the National Science Foundation

NSF 1970 SUMMER INSTITUTE PARTICIPANT QUESTIONNAIRE

SECTION I

A (1-4) **1** Age at last birthday _____

(5) **2** Sex: Male ____ Female ____

		Which degrees have you earned?	Major Field	Minor Field(s)		Year
(6-15)	**3**	Bachelor's	_____	____	_____	_____
(16-25)		Master's	_____	____	_____	_____
(26-35)		Specialist in Education	_____	____	_____	_____
(35-45)		Other (specify)	_____	____	_____	_____

(46) **4** In what type of school did you teach in 1970-71?
Grades 7-8 _____ 7-9 _____ 7-12 _____ 9-12 _____ 10-12 _____
Other (Give grade range) _____

(47) **5** Years of teaching experience as of June 1970
0-2 _____ 3-5 _____ 6-10 _____ more than 10 _____

(48-49) **6** **Average** enrollment **per grade** in your school in 1970-71.

under 100 _____	400-499 _____	800-899 _____
100-199 _____	500-599 _____	900-999 _____
200-299 _____	600-699 _____	1000 and over _____
300-399 _____	700-799 _____	

Your teaching assignment for fall term, 1970: Circle the number of classes taught by subject.

(50)	**7**	Economics	1 2 3 4 5or more
(51)	**8**	Geography	1 2 3 4 5or more
(52)	**9**	History	1 2 3 4 5or more
(53)	**10**	Psychology	1 2 3 4 5or more
(54)	**11**	Sociology	1 2 3 4 5or more
(55)	**12**	Anthropology	1 2 3 4 5or more
(56)	**13**	Social Studies/Social Science (not listed above)	1 2 3 4 5or more
(57)	**14**	Mathematics	1 2 3 4 5or more
(58)	**15**	Biology or Biological Science	1 2 3 4 5or more
(59)	**16**	Chemistry	1 2 3 4 5or more
(60)	**17**	Earth Science	1 2 3 4 5or more
(61)	**18**	General Science	1 2 3 4 5or more
(62)	**19**	Integrated Physical Science	1 2 3 4 5or more
(63)	**20**	Physics	1 2 3 4 5or more
(64)	**21**	Other (please specify) _____	1 2 3 4 5or more
(65)		_____	1 2 3 4 5or more
(66)		_____	1 2 3 4 5or more

(67) **22** In addition to teaching during 1970-71 I had supervisory, advisory, or administrative responsibilities. Yes ____ No ____

(68) **23** I had no teaching assignment, but served as a supervisor or in an advisory capacity. Yes ___ No ___

(69) **24** Do you consider your 1970-fall teaching or supervisory assignment as primarily junior high or senior high? Junior high ___ Senior high ___ Cannot distinguish ___ Other _____

(70-71) **25** Regardless of your 1970-71 assignment, with what secondary school activity or teaching field do you most prefer to be identified? _____

SECTION II

Indicate your previous participation in **NSF**-supported programs prior to the summer of 1970. (Secondary School is defined here as Grades 7-12.)

For each type of program below, as appropriate, give the year of your most recent attendance and the year of your second most recent attendance.

			Number Attended (Before 1970)	Most recent	2nd Most recent
(72-81)	26	Academic Year Institute for Secondary School Teachers (full-time attendance)	_____	_____	_____
(82-91)	27	In-Service Institutes for Secondary School Teachers (part-time attendance)	_____	_____	_____
(92-101)	28	Summer Institutes for Secondary School Teachers	_____	_____	_____
(102-111)	29	Summer Conferences for Secondary School Teachers	_____	_____	_____
(112-121)	30	Research Participation for High School Teachers	_____	_____	_____
(112-131)	31	Cooperative College-School Science Program (CCSS)	_____	_____	_____
(132-141)	32	Other **NSF** Fellowship or Traineeship Program	_____	_____	_____

SECTION III

The following items refer to changes in your professional duties and status. Indicate the effects which are **directly attributable** to your participation in the 1970 Summer Institute (SI). (If you have participated in **NSF**-supported institutes before that time your answer should reflect the cumulative effect of all institutes attended through the summer of 1970.)

			Yes	No
(142)	33	Moved to another school	_____	_____
(143)	34	Received a different teaching assignment	_____	_____
(144)	35	Received a special purpose teaching assignment, such as a class for exceptional children or children with special needs	_____	_____
(145)	36	Received a more advanced teaching assignment, i.e., more sophisticated subject matter	_____	_____
(146)	37	Assigned to curriculum supervision	_____	_____
(147)	38	Became a department chairman or its equivalent	_____	_____
(148)	39	Received a reduced teaching load or released time for curriculum development or related activities	_____	_____
(149)	40	Assigned curriculum development without released time, for example, curriculum committee assignment	_____	_____
(150)	41	Conducted or otherwise arranged for in-service training of other teachers	_____	_____

SECTION IV

This section lists numerous generally recognized educational needs. In each of the columns check those needs that apply as follows:

A. Which of the educational needs do you feel are particularly important to you for the teaching of your subject? (Check in column A.)

B. Which needs had you expected the 1970 SI to help you in meeting? (Check in column B.)

C. Which needs did the 1970 SI actually help you in meeting? (Check in column C.)

D. Answer this item if you had experience in **NSF**-supported institutes prior to the 1970 SI. Which needs did your total institute experience actually help you in meeting? (Check in column D.)

			Educational Needs	A Your needs in teaching the subject	B Your Expectations for the SI	C Your needs which the 1970 SI helped to meet	D Cumulative Effect
B	(1-4)	42	Individualizing learning	____	____	____	____
	(5-8)	43	Adapting instruction to slow learners	____	____	____	____
	(9-12)	44	Adapting instruction to high ability students	____	____	____	____
	(13-16)	45	Adapting inductive (discovery) methods of teaching	____	____	____	____
	(17-20)	46	Having students become more actively involved in the learning process	____	____	____	____
	(21-24)	47	Motivating reluctant learners	____	____	____	____
	(25-28)	48	Providing more courses in your subject area for non-college bound students	____	____	____	____
	(29-32)	49	Providing for continuous progress of students (self-paced learning)	____	____	____	____
	(33-36)	50	Providing content for courses utilizing computers	____	____	____	____
	(37-40)	51	Using computer-assisted instruction	____	____	____	____
	(41-44)	52	Up dating subject-matter background	____	____	____	____
	(45-48)	53	Introducing teachers to new curriculum developments	____	____	____	____
	(49-52)	54	Relating science and non-science areas through interdisciplinary approaches	____	____	____	____
	(53-56)	55	Fusing science courses and/or science and math courses	____	____	____	____
	(57-60)	56	Providing teachers with greater in-depth training (e.g. master's degree, etc.)	____	____	____	____
	(61-64)	57	Providing teachers with refresher study	____	____	____	____
	(65-68)	58	Strengthening teachers' backgrounds in allied subjects	____	____	____	____
	(69-72)	59	Developing courses specifically designed for local students	____	____	____	____
	(73-76)	60	Providing teachers with actual research experience	____	____	____	____
	(77-80)	61	Utilizing resources outside of the school	____	____	____	____
	(81-84)	62	Using existing laboratory space and materials more effectively	____	____	____	____
	(85-88)	63	Obtaining additional laboratory facilities	____	____	____	____
	(89-92)	64	Obtaining additional laboratory equipment	____	____	____	____

SECTION V

For each item check the **one and only one** response which best indicates the extent to which your participation in institute(s) has contributed to that result.

(THE DESIGNATION OF MATH/SCIENCE IN THE ITEMS DESIGNATES THE **AREA(S)** *STUDIES BY* **YOU** *IN YOUR INSTITUTE (E.G., IF YOU STUDIES ECONOMICS IN THE INSTITUTE, THIS IS THE AREA UNDER CONSIDERATION). INTERPRET THE WORD LABORATORY IN THE BROAD SENSE TO COVER YOUR DISCIPLINE.) ALL QUESTIONS CONCERNING YOUR CLASSROOM INSTRUCTION RELATE TO THE PERIOD BEGINNING FROM FALL 1970 TO THE PRESENT.*

			negligible or none	*little*	*moderately*	*considerably*	*a great deal*
(93)	65	increased your math/science knowledge, directly related to the math/science you teach	—	—	—	—	—
(94)	66	increased your math/science knowledge	—	—	—	—	—
(95)	67	increased your professional competence in teaching math/science	—	—	—	—	—
(96)	68	increased confidence in your ability to present math/science	—	—	—	—	—
(97)	69	increased your ability to judge content for your classes	—	—	—	—	—
(98)	70	increased knowledge of new teaching techniques	—	—	—	—	—
(99)	71	led you to implement new teaching techniques in your classes	—	—	—	—	—
(100)	72	increased your stimulation of student interest in math/science	—	—	—	—	—
(101)	73	increased your effectiveness in classroom teaching	—	—	—	—	—
(102)	74	enabled you to teach units or content not previously taught by you in existing courses	—	—	—	—	—
(103)	75	led you to introduce new units and topics into existing courses	—	—	—	—	—
(104)	76	led you to introduce laboratory experiences into courses that previously contained none	—	—	—	—	—
(105)	77	led you to add additional laboratory demonstrations, techniques, or experiments to existing laboratory courses	—	—	—	—	—
(106)	78	led you to modify laboratory demonstrations, techniques, or experiments in existing laboratory courses	—	—	—	—	—
(107)	79	led you to delete portions of content previously included in your courses	—	—	—	—	—
(108)	80	increased your enthusiasm for teaching math/science	—	—	—	—	—
(109)	81	increased your ability to individualize the math/science instruction for your students	—	—	—	—	—
(110)	82	increased the individualization of the math/science instruction for your students	—	—	—	—	—
(111)	83	increased your feeling of personal accomplishment in successfully having completed the institute	—	—	—	—	—
(112)	84	led you to increase your personal study of new math/science programs	—	—	—	—	—
(113)	85	led you to increase your membership in professional organizations	—	—	—	—	—
(114)	86	led you to increase your active participation in professional organizations	—	—	—	—	—

			negligible or no	little	moderately	considerably	a great deal
(115)	87	increased your influence on other math/science teachers in your school with respect to subject-matter competence	—	—	—	—	—
(116)	88	increased your influence on other math/science teachers in your school with respect to teaching techniques	—	—	—	—	—
(117)	89	increased your influence on other math/science teachers in your school with respect to implementing new curriculum materials	—	—	—	—	—
(118)	90	(Respond only if you are a supervisor) the extent to which your institute training has been used to supervise the math/science programs in your school	—	—	—	—	—

SECTION VI

The following objectives are those established by NSF for its SI program. However, no single institute is designed to meet all the objectives.

A. At the time you submitted an application to your 1970 Summer Institute, what did you perceive its objectives to be? Indicate the most important one by writing the symbol **1** in the appropriate blank in column A. Indicate (in order of priority) any other objectives that you judged to be important in that institute by writing the symbols **2, 3,** . . . (etc.) in the appropriate blanks. (Do not rank any two objectives the same in this column.)

B. In column B indicate the objective that you feel was met most successfully in the institute for the participant group as a whole, by writing the symbol **1** in the appropriate blank. Indicate (in order of most successful accomplishment) the other objectives that you judge were met by the institute for the participant group in general; do this by writing the symbols **2, 3,** . . . (etc.) in the appropriate blanks in column B. (Do not rank any two objectives the same in this column.)

			A	B	
C	(1-4)	91	—	—	To update subject-matter knowledge of teachers who were once adequately prepared
	(5-8)	92	—	—	To provide in-depth training to enable teachers to meet new, higher standards (such as those represented by a master's degree)
	(9-12)	93	—	—	To provide remedial study for those teachers who never had adequate training in the subject(s) they teach
	(13-16)	94	—	—	To strengthen teachers' background in allied subjects prerequisite to suitable mastery of a field
	(17-20)	95	—	—	To acquaint teachers with new curriculum materials and teaching methods
	(21-24)	96	—	—	To assist teachers in developing materials and courses adapted to individual teaching locales
	(25-28)	97	—	—	To prepare teachers for assignments involving special problems (i.e., courses for slow learners, Advance Placement courses, etc.)
	(29-32)	98	—	—	To provide research experience to contribute to understanding of science
	(33-36)	99	—	—	To develop leadership and supervisory potential (as by preparing teachers to teach their colleagues, or by training for supervisory assignments, etc.)
	(37-40)	100	—	—	(Other objectives not included in the above list) **Specify:**

SECTION VII

According to **NSF** records, you attended one of the institutes which was oriented towards one of the new curriculum projects. Please supply the following information about that particular institute.

(41-60) **101** Which curriculum project was emphasized? (The initials or acronym will suffice.) _____

(61) **102** How much of the institute was devoted to the project?

_____ 75 per cent or more
_____ 50 per cent - 75 per cent
_____ less than 50 per cent

(62-63) **103** Has the curriculum project studied in the institute been implemented in your classroom?

_____ Yes
_____ No, not the entire curriculum but substantial portions of materials, approaches, or ideas have been implemented.
_____ No, but it has been implemented in my school.
_____ No, but there are plans to implement it in my classroom next year.
_____ No, but there are plans to implement it in my school next year, but perhaps not in my classroom.
_____ No, and at the time it looks as though we will not be adopting the curriculum project.
_____ Other (please explain)

(64) **104** If your school has implemented the curriculum project, when was it introduced?

_____ 1968-1969 or earlier
_____ 1969-1970
_____ 1970-1971
_____ 1971-1972

(65) **105** What was your main objective for selecting this particular institute? Check only one response.

_____ I had not yet taught in the curriculum project but was expected to do so in the future.
_____ I had been teaching in the curriculum project without formal background in it.
_____ I wanted to obtain information which would help in deciding the suitability of the curriculum project for adoption in our school
_____ I needed the background necessary for leadership in the implementation of the curriculum project in our school system.
_____ Other **Specify**:

Please place any additional comments below that will be beneficial to NSF personnel in planning future institutes.

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APPENDIX B

LEVELS OF WORK OF 1970 SUMMER INSTITUTES

The planned level of work by the participants in the institute courses was also supplied to the project staff by NSF personnel The levels of work were coded by NSF as follows:

(0) Work at level of introductory course such as might be offered to students who have practically no academic background in the basic subject matter;

(1) Work at level normally requiring approximately a year (6-10 semester-hours) of prior study of basic subject matter;

(2) Work at level normally requiring about 2 years (12-18 semester-hours) of prior study of basic subject matter;

(3) Work at level normally requiring about 3 years of prior study of basic subject matter;

(4) Work at level comparable to that of the usual subject-matter course for advanced undergraduates or beginning graduates, assuming a background essentially equivalent to an undergraduate major in the field;

(5) Work at level comparable to that of the usual graduate courses in the field.

For the purpose of comparison within this study the project staff grouped the planned level of work as follows: If the arithmetic average of the level or levels indicated for an institute was 2 or less it was designated as a Level A institute. If the average was more than 2 it was designated as a Level B institute. This classification enabled comparisons between participants who had no academic background up to approximately a minor in a basic subject area to those participants who had work beyond a minor up through graduate preparation in a subject area.

APPENDIX C

Distributions of Questionnaires Sent and Returned and the Per Cents of Returns by Disciplines for the Sample and Census

	Sample		Census	
BZ	264 sent	213 returned 81%	BZ	
CH	132 sent	100 returned 75%	CH	
EN			EN	152 sent 117 returned 77%
EZ	66 sent	55 returned 83%	EZ	929 sent 791 returned 85%
GG	22 sent	15 returned 68%	GG	78 sent 65 returned 83%
GS	44 sent	29 returned 66%	GS	991 sent 844 returned 85%
MA	726 sent	574 returned 79%	MA	383 sent 320 returned 84%
PS			PS	74 sent 66 returned 89%
PY	108 sent	94 returned 86%	PY	483 sent 371 returned 77%
RD	22 sent	17 returned 77%	RD	
SE			SE	247 sent 217 returned 88%
SO			SO	225 sent 178 returned 79%
SU			SU	132 sent 118 returned 89%
XX	374 sent	292 returned 78%	XX	
Total	1758 sent	1389 returned 79.01%		3694 sent 3087 returned 83.57%

APPENDIX D

Age-Sex Distributions of the Disciplines of the Sample and the Disciplines and Implementation Groups of the Census

TABLE D 1

Age-Sex Distributions of the Biology Group of the Sample

	Under 30	30-39	Over 39	Total
Male	48 .23	66 .31	36 .17	150 .71
Female	24 .11	18 .09	18 .09	60 .29
Total	72 .34	84 .40	54 .26	210
% Female	.33	.21	.33	

TABLE D 2

Age-Sex Distributions of the Chemistry Group of the Sample

	Under 30	30-39	Over 39	Total
Male	30 .31	32 .33	16 .16	78 .80
Female	6 .06	4 .04	9 .09	19 .20
Total	36 .37	36 .37	25 .26	97
% Female	.17	.11	.36	

TABLE D 3

Age-Sex Distributions of the Earth Science Group of the Sample

	Under 30	30-39	Over 39	Total
Male	14 .26	15 .28	11 .20	40 .74
Female	5 .09	4 .07	5 .09	14 .26
Total	19 .35	19 .35	16 .30	54
% Female	.26	.21	.31	

TABLE D 4

Age-Sex Distributions of the General Science Group of the Sample

	Under 30	30-39	Over 39	Total
Male	6 .21	9 .31	3 .10	18 .62
Female	4 .14	5 .17	2 .07	11 .38
Total	10 .34	14 .48	5 .17	29
% Female	.40	.36	.40	

TABLE D 5

Age-Sex Distributions of the Mathematics Group of the Sample

	Under 30	30-39	Over 39	Total
Male	148 .26	174 .31	78 .14	400 .71
Female	76 .13	38 .07	53 .09	167 .29
Total	224 .40	212 .37	131 .23	567
% Female	.34	.18	.40	

TABLE D 6

Age-Sex Distributions of the Physics Group of the Sample

	Under 30	30-39	Over 39	Total
Male	36 .38	29 .31	19 .20	84 .89
Female	3 .03	4 .04	3 .03	10 .11
Total	39 .41	33 .35	22 .23	94
% Female	.08	.12	.14	

TABLE D 7

Age-Sex Distributions of the Multiple Fields Group of the Sample

	Under 30	30-39	Over 39	Total
Male	87 .30	83 .29	46 .16	216 .74
Female	20 .07	27 .09	27 .09	74 .26
Total	107 .37	110 .38	73 .25	290
% Female	.19	.25	.37	

TABLE D 8

Age-Sex Distributions of the Earth Science Group of the Census

	Under 30	30-39	Over 39	Total
Male	184 .23	245 .31	182 .23	611 .78
Female	56 .07	61 .08	57 .07	174 .22
Total	240 .31	306 .39	239 .30	785
% Female	.23	.20	.24	

TABLE D 9

Age-Sex Distributions of the Geography Group of the Census

	Under 30	30-39	Over 39	Total
Male	18 .29	14 .23	16 .26	48 .77
Female	2 .03	3 .05	9 .15	14 .23
Total	20 .32	17 .27	25 .40	62
% Female	.10	.18	.36	

TABLE D 10

Age-Sex Distributions of the General Science Group of the Census

	Under 30	30-39	Over 39	Total
Male	191 .23	279 .34	185 .22	655 .79
Female	33 .04	50 .06	91 .11	174 .21
Total	224 .27	329 .40	276 .33	829
% Female	.15	.15	.33	

TABLE D 11

Age-Sex Distributions of the Psychology Group of the Census

	Under 30	30-39	Over 39	Total
Male	8 .13	18 .28	19 .30	45 .70
Female	3 .05	2 .03	14 .22	19 .30
Total	11 .17	20 .31	33 .52	64
% Female	.27	.10	.42	

TABLE D 12

Age-Sex Distributions of the Economics Group of the Census

	Under 30	30-39	Over 39	Total
Male	39 .18	79 .37	54 .25	172 .80
Female	10 .05	11 .05	22 .10	43 .20
Total	49 .23	90 .42	76 .35	215
% Female	.20	.12	.29	

TABLE D 13

Age-Sex Distributions of the Sociology Group of the Census

	Under 30	30-39	Over 39	Total
Male	30 .17	61 .35	27 .15	118 .67
Female	13 .07	20 .11	24 .14	57 .33
Total	43 .25	81 .46	51 .29	175
% Female	.30	.25	.47	

TABLE D 14

Age-Sex Distributions of the Engineering Concepts Curriculum Project (ECCP) Group of the Census

	Under 30	30-39	Over 39	Total
Male	21 .18	43 .37	46 .40	110 .95
Female	2 .02	1 .01	3 .03	6 .05
Total	23 .20	44 .38	49 .42	116
% Female	.09	.02	.06	

TABLE D 15

Age-Sex Distributions of the Earth Science Curriculum Project (ESCP) Group of the Census

	Under 30	30-39	Over 39	Total
Male	76 .24	89 .28	83 .26	248 .78
Female	24 .08	20 .06	24 .08	68 .22
Total	100 .32	109 .34	107 .34	316
% Female	.24	.18	.22	

TABLE D 16

Age-Sex Distributions of the Intermediate Science Curriculum Study (ISCS) Group of the Census

	Under 30	30-39	Over 39	Total
Male	14 .19	30 .41	17 .23	61 .82
Female	5 .07	3 .04	5 .07	13 .18
Total	19 .26	33 .45	22 .30	74
% Female	.26	.09	.23	

TABLE D 17

Age-Sex Distributions of the Introductory Physical Science (IPS) Group of the Census

	Under 30	30-39	Over 39	Total
Male	44 .18	74 .30	65 .26	183 .74
Female	11 .04	16 .07	36 .15	63 .26
Total	55 .22	90 .37	101 .41	246
% Female	.20	.18	.36	

TABLE D 18

Age-Sex Distributions of the Harvard Project-Physics (HHP) Group of the Census

	Under 30	30-39	Over 39	Total
Male	76 .21	109 .30	132 .36	317 .86
Female	7 .02	20 .05	24 .07	51 .14
Total	83 .23	129 .35	156 .42	368
% Female	.08	.16	.15	

TABLE D 19

Age-Sex Distributions of the University of Illinois Committee on School Mathematics (UICSM) Group of the Census

	Under 30	30-39	Over 39	Total
Male	51 .16	75 .24	78 .25	204 .64
Female	39 .12	27 .09	47 .15	113 .36
Total	90 .28	102 .32	125 .39	317
% Female	.43	.26	.38	

TABLE D 20

Age-Sex Distributions of the Sociological Resources for Secondary Schools (SRSS) Group of the Census

	Under 30	30-39	Over 39	Total
Male	22 .19	40 .34	18 .15	80 .68
Female	8 .07	10 .09	19 .16	37 .32
Total	30 .26	50 .43	37 .32	117
% Female	.27	.20	.51	

APPENDIX E

Teaching Assignment Distributions of the Disciplines of the Sample and of the Disciplines and Implementation Groups of the Census

TABLE E 1

Teaching Assignment Distributions of the Disciplines of the Sample

Group	Jr. High	Sr. High	Cannot Distinguish	Other	Omit
Biology	73 .34	127 .60	5 .02	1 .00	7 .03
Chemistry	4 .04	83 .83	5 .05	1 .01	7 .07
Earth Science	35 .64	15 .27	0 .00	1 .02	4 .07
General Science	8 .62	9 .31	0 .00	0 .00	2 .07
Mathematics	145 .25	361 .63	26 .05	18 .03	24 .04
Physics	12 .13	69 .73	4 .04	6 .06	3 .03
Multiple Science	80 .27	189 .65	5 .02	4 .01	14 .05

TABLE E 2

Teaching Assignment Distributions of the Disciplines of the Census

Group	Jr. High	Sr. High	Cannot Distinguish	Other	Omit
Earth Science	456 .58	276 .35	21 .03	19 .02	19 .02
Geography	50 .77	10 .15	0 .00	3 .05	2 .03
General Science	522 .62	252 .30	20 .02	27 .03	23 .03
Psychology	11 .17	50 .76	0 .00	1 .02	4 .06
Economics	23 .11	171 .79	4 .02	9 .04	10 .05
Sociology	30 .17	128 .72	3 .02	1 .01	16 .09

TABLE E 3

Teaching Assignment Distributions of the Implementation Groups of the Census

Group	Jr. High	Sr. High	Cannot Distinguish	Other	Omit
Engineering Concepts Curriculum Project (ECCP)	9 .08	102 .87	3 .02	0 .00	3 .03
Earth Science Curriculum Project (ESCP)	194 .61	96 .30	11 .03	9 .03	6 .02
Intermediate Science Curriculum Study (ISCS)	65 .82	7 .09	1 .01	3 .04	3 .04
Introductory Physical Science (IPS)	146 .58	89 .35	5 .01	7 .03	5 .02
Harvard Project-Physics (HPP)	16 .04	321 .87	9 .02	9 .02	16 .04
University of Illinois Committee on School Mathematics (UICSM)	196 .61	103 .32	4 .01	11 .03	6 .02
Sociological Resources for Secondary Schools (SRSS)	20 .17	84 .71	3 .02	1 .01	11 .09

APPENDIX F

Distributions of Yes Responses to Section III Items for the Disciplines of the Sample and for the Disciplines and Implementation Groups of the Census

TABLE F 1

Distributions of Yes Responses to Section III Items for the Disciplines of the Sample

Group	Item 33 Moved	34 Dif. Asmt.	35 Sp. Asmt.	36 Adv. Asmt.	37 Supt.	38 Dept. Ch.	39 Red. Load	40 Curr. Dev.	41 In-Serv.
Biology	39 .18	69 .32	32 .15	95 .45	28 .13	52 .24	16 .08	58 .27	30 .14
Chemistry	13 .13	26 .26	13 .13	38 .38	12 .12	16 .16	8 .08	20 .20	8 .08
Earth Science	9 .16	23 .42	6 .11	17 .31	6 .11	12 .22	2 .04	16 .29	10 .18
General Science	5 .17	8 .28	2 .07	7 .24	3 .10	5 .17	3 .10	7 .24	2 .07
Mathematics	74 .13	166 .29	83 .14	233 .41	65 .11	97 .17	38 .07	122 .21	47 .08
Physics	12 .13	25 .27	12 .13	35 .37	13 .14	16 .17	8 .09	23 .24	20 .21
Multiple Fields	54 .18	78 .27	34 .12	104 .36	39 .13	73 .25	18 .06	73 .25	31 .11

TABLE F 2

Distributions of Yes Responses to Section III Items for the Disciplines of the Census

Group	Item 33 Moved	34 Dif. Asmt.	35 Sp. Asmt.	36 Adv. Asmt.	37 Supt.	38 Dept. Ch.	39 Red. Load	40 Curr. Dev.	41 In-Serv.
Earth Science	129	310	96	265	120	161	74	246	135
	.16	.39	.12	.34	.15	.20	.09	.31	.17
Geography	5	23	5	20	5	16	4	20	11
	.08	.35	.08	.31	.08	.25	.06	.31	.17
General Science	144	313	96	280	115	200	72	214	166
	.17	.37	.11	.33	.14	.24	.09	.25	.20
Psychology	6	16	6	30	10	19	10	19	10
	.09	.24	.09	.45	.15	.29	.15	.29	.15
Economics	19	62	21	81	35	40	18	67	40
	.09	.29	.10	.37	.16	.18	.08	.31	.18
Sociology	21	60	19	69	37	45	23	62	40
	.12	.34	.11	.39	.21	.25	.13	.35	.22

TABLE F 3

Distributions of Yes Responses to Section III Items for the Implementation Groups of the Census

Group	Item 33 Moved	34 Dif. Asmt.	35 Sp. Asmt.	36 Adv. Asmt.	37 Supt.	38 Dept. Ch.	39 Red. Load	40 Curr. Dev.	41 In-Serv.
Engineering Concepts Curriculum Project (ECCP)	22 .19	37 .32	21 .18	45 .38	22 .19	27 .23	17 .15	30 .26	19 .16
Earth Science Curriculum Project (ESCP)	44 .14	134 .42	36 .11	103 .33	53 .17	75 .24	28 .09	110 .35	60 .19
Intermediate Science Curr. Study (ISCS)	10 .13	27 .34	7 .09	22 .28	12 .15	16 .20	4 .05	28 .35	26 .33
Introductory Physical Science (IPS)	47 .19	118 .47	44 .17	94 .37	38 .15	65 .26	22 .09	64 .25	62 .25
Harvard Project Physics (HPP)	64 .17	121 .33	46 .12	125 .34	50 .13	91 .25	26 .07	111 .30	70 .19
U. of Illinois Committee on School Math. (UICSM)	53 .17	107 .33	128 .40	116 .36	39 .12	62 .19	32 .10	86 .27	57 .18
Sociological Resources for Second. Schools (SRSS)	14 .12	33 .28	12 .10	43 .36	23 .19	28 .24	15 .13	41 .34	26 .22

APPENDIX G

Distributions of Responses to Section IV Items for the Disciplines of the Sample and for the Disciplines and Implementation Groups of the Census

TABLE G 1

Distributions of Responses to Section IV Items for the Biology Group of the Sample

Item	A	C	C/B
42 (Indv.)	.65	.34	1.16
43 (Slow)	.54	.15	.89
44 (Able)	.55	.47	1.22
45 (Induct.)	.65	.49	.96
46 (Active Invol.)	.69	.51	1.00
47 (Motivate)	.60	.20	.81
48 (Non-college)	.37	.12	.81
49 (Self-paced)	.38	.16	.87
50 (Computers)	.10	.05	.77
51 (Comp. Asst. Inst.)	.08	.03	.70
52 (Up-Date)	.69	.65	1.01
53 (Curr. Dev.)	.44	.38	1.01
54 (Interdiscp.)	.36	.18	1.03
55 (Fusing)	.29	.16	.90
56 (In-Depth)	.60	.58	.98
57 (Refresh.)	.54	.51	1.09
58 (Allied Subs.)	.50	.42	1.06
59 (Local)	.32	.16	.97
60 (Research)	.37	.39	1.11
61 (Outside Resources)	.46	.33	1.09
62 (Effective Lab. Use)	.51	.40	.96
63 (Add. Lab. Space)	.31	.10	1.22

TABLE G 2

Distributions of Responses to Section IV Items
for the Chemistry Group of the Sample

Item	A	C	C/B
42 (Indv.)	.58	.19	.86
43 (Slow)	.34	.06	.60
44 (Able)	.65	.51	1.00
45 (Induct.)	.60	.32	.74
46 (Active Invol.)	.69	.30	.81
47 (Motivate)	.44	.10	.71
48 (Non-college)	.31	.06	.60
49 (Self-paced)	.29	.14	1.27
50 (Computers)	.17	.07	.64
51 (Comp. Asst. Inst.)	.15	.11	1.22
52 (Up-Date)	.70	.64	.97
53 (Curr. Dev.)	.40	.32	.86
54 (Interdiscp.)	.40	.14	.88
55 (Fusing)	.35	.28	1.00
56 (In-Depth)	.57	.52	.98
57 (Refresh.)	.52	.51	.98
58 (Allied Subs.)	.44	.27	.87
59 (Local)	.15	.04	.57
60 (Research)	.27	.16	1.07
61 (Outside Resources)	.27	.07	.88
62 (Effective Lab. Use.)	.53	.35	1.03
63 (Add. Lab. Space)	.30	.06	.46
64 (Add. Lab. Equip.)	.51	.18	.90

TABLE G 3

Distributions of Responses to Section IV Items
for the Earth Science Group of the Sample

Item	A	C	C/B*
42 (Indv.)	.71	.18	.63
43 (Slow)	.65	.16	.56
44 (Able)	.62	.35	1.12
45 (Induct.)	.75	.38	.91
46 (Active Invol.)	.84	.44	.92
47 (Motivate)	.73	.18	.48
48 (Non-college)	.40	.11	.75
49 (Self-paced)	.47	.09	.56
50 (Computers)	.13	.02	
51 (Comp. Asst. Instr.)	.13	.02	
52 (Up-Date)	.76	.65	1.13
53 (Curr. Dev.)	.51	.31	1.06
54 (Interdiscp.)	.44	.09	.83
55 (Fusing)	.44	.24	1.00
56 (In-Depth)	.60	.47	1.00
57 (Refresh.)	.62	.47	1.04
58 (Allied Subs.)	.60	.51	.93
59 (Local)	.45	.22	.86
60 (Research)	.42	.36	1.25
61 (Outside Resources)	.56	.53	1.04
62 (Effective Lab. Use)	.58	.25	.93
63 (Add. Lab. Space)	.31	.07	1.33
64 (Add. Lab Equip.)	.36	.07	1.33

* No C/B value indicates that the B-value was zero.

TABLE G 4

Distributions of Responses to Section IV Items
for the General Science Group of the Sample

Item	A	C	C/B*
42 (Indv.)	.55	.34	1.00
43 (Slow)	.55	.14	.57
44 (Able)	.45	.31	1.00
45 (Induct.)	.69	.52	1.00
46 (Active Invol.)	.59	.48	1.17
47 (Motivate)	.52	.31	1.00
48 (Non-college)	.28	.07	
49 (Self-paced)	.31	.28	1.00
50 (Computers)	.10	.14	1.33
51 (Comp. Asst. Inst.)	.07	.10	1.50
52 (Up-Date)	.59	.45	1.00
53 (Curr. Dev.)	.45	.45	1.08
54 (Interdiscp.)	.24	.21	2.00
55 (Fusing)	.41	.45	1.44
56 (In-Depth)	.45	.38	.79
57 (Refresh.)	.45	.52	1.15
58 (Allied Subs.)	.55	.48	1.08
59 (Local)	.14	.14	2.00
60 (Research)	.14	.28	2.00
61 (Outside Resources)	.31	.31	1.50
62 (Effective Lab. Use)	.48	.52	1.36
63 (Add. Lab. Space)	.17	.10	1.50
64 (Add. Lab. Equip.)	.28	.14	1.00

* No C/B value indicates that the B-value was zero.

TABLE G 5

Distributions of Responses to Section IV Items
for the Mathematics Group of the Sample

Item	A	C	C/B
42 (Indv.)	.66	.23	.80
43 (Slow)	.58	.13	.59
44 (Able)	.58	.43	.98
45 (Induct)	.55	.35	.92
46 (Active Invol.)	.66	.26	.74
47 (Motivate)	.61	.13	.48
48 (Non-college)	.37	.06	.59
49 (Self-paced)	.39	.10	.67
50 (Computers)	.30	.15	.74
51 (Comp. Asst. Inst.)	.22	.11	.76
52 (Up-Date)	.63	.59	1.01
53 (Curr. Dev.)	.47	.35	.87
54 (Interdisep.)	.25	.06	.75
55 (Fusing)	.26	.08	.76
56 (In-Depth)	.57	.56	.95
57 (Refresh.)	.52	.53	1.01
58 (Allied Subs.)	.37	.25	.94
59 (Local)	.18	.05	.65
60 (Research)	.18	.11	.84
61 (Outside Resources)	.25	.10	.89
62 (Effective Lab. Use)	.21	.05	.61
63 (Add. Lab. Space)	.16	.03	.56
64 (Add. Lab. Equip.)	.17	.03	.57

TABLE G 6

Distributions of Responses to Section IV Items
for the Physics Group of the Sample

Item	A	C	C/B
42 (Indv.)	.61	.20	.83
43 (Slow)	.39	.12	.65
44 (Able)	.62	.39	.84
45 (Induct.)	.60	.33	.89
46 (Active Invol.)	.63	.28	.81
47 (Motivate)	.52	.15	.58
48 (Non-college)	.43	.11	1.11
49 (Self-paced)	.37	.09	.80
50 (Computers)	.16	.02	.22
51 (Comp. Asst. Inst.)	.18	.03	.43
52 (Up-Date)	.72	.70	.97
53 (Curr. Dev.)	.43	.31	.83
54 (Interdiscp.)	.44	.16	.68
55 (Fusing)	.45	.32	1.00
56 (In-Depth)	.64	.62	1.02
57 (Refresh.)	.51	.51	.91
58 (Allied Subs.)	.61	.56	.96
59 (Local)	.14	.07	1.00
60 (Research)	.29	.13	.75
61 (Outside Resources)	.26	.07	.64
62 (Effective Lab. Use)	.60	.32	.73
63 (Add. Lab. Space)	.34	.06	.75
64 (Add. Lab. Equip.)	.41	.14	.65

TABLE G 7

Distributions of Responses to Section IV Items
for the Multiple Fields Group of the Sample

Item	A	C	C/B
42 (Indv.)	.60	.24	.81
43 (Slow)	.41	.08	.59
44 (Able)	.58	.38	.90
45 (Induct.)	.63	.35	.85
46 (Active Invol.)	.64	.35	.89
47 (Motivate)	.50	.18	.76
48 (Non-college)	.29	.08	.64
49 (Self-paced)	.34	.11	.89
50 (Computers)	.16	.10	1.07
51 (Comp. Asst. Inst.)	.11	.06	1.00
52 (Up-Date)	.68	.65	.98
53 (Curr. Dev.)	.46	.33	.85
54 (Interdiscp.)	.35	.18	.90
55 (Fusing)	.41	.32	1.11
56 (In-Depth)	.63	.62	.94
57 (Refresh.)	.56	.59	.98
58 (Allied Subs.)	.52	.53	1.03
59 (Local)	.23	.06	.67
60 (Research)	.28	.21	.95
61 (Outside Resources)	.34	.21	1.03
62 (Effective Lab. Use)	.40	.27	.87
63 (Add. Lab. Space)	.27	.08	.88
64 (Add. Lab. Equip.)	.34	.13	1.26

TABLE G 8

Distributions of Responses to Section IV Items
for the Earth Science Group of the Census

Item	A	C	C/B
42 (Indv.)	.66	.34	.96
43 (Slow)	.52	.16	.75
44 (Able)	.49	.36	1.08
45 (Induct.)	.66	.50	1.00
46 (Active Invol.)	.68	.49	.97
47 (Motivate)	.59	.23	.77
48 (Non-college)	.33	.15	.92
49 (Self-paced)	.35	.13	.80
50 (Computers)	.07	.02	.46
51 (Comp. Asst. Inst.)	.06	.02	.82
52 (Up-date)	.67	.67	1.03
53 (Curr. Dev.)	.42	.38	.96
54 (Interdiscp.)	.36	.16	.90
55 (Fusing)	.35	.19	1.03
56 (In-depth)	.53	.53	1.02
57 (Refresh.)	.49	.48	1.07
58 (Allied Subs.)	.54	.54	1.01
59 (Local)	.30	.20	1.05
60 (Research)	.34	.35	.97
61 (Outside Resources)	.49	.46	1.11
62 (Effective Lab. Use)	.52	.36	.99
63 (Add. Lab. Space)	.31	.10	.92
64 (Add. Lab. Equip.)	.38	.19	1.17

TABLE G 9

Distributions of Responses to Section IV Items
for the Geography Group of the Census

Item	A	C	C/B*
42 (Indv.)	.68	.40	1.08
43 (Slow)	.49	.26	.94
44 (Able)	.45	.42	1.23
45 (Induct.)	.65	.66	1.16
46 (Active Invol.)	.71	.69	1.18
47 (Motivate)	.74	.45	1.32
48 (Non-college)	.23	.06	.57
49 (Self-paced)	.38	.18	1.09
50 (Computers)	.05	.02	
51 (Comp. Asst. Inst.)	.09	.05	1.50
52 (Up-date)	.66	.83	1.10
53 (Curr. Dev.)	.57	.60	1.03
54 (Interdiscp.)	.38	.35	1.05
55 (Fusing)	.31	.31	1.00
56 (In-depth)	.51	.49	.97
57 (Refresh.)	.52	.69	1.13
58 (Allied Subs.)	.57	.71	1.18
59 (Local)	.35	.25	1.14
60 (Research)	.32	.42	1.29
61 (Outside Resources)	.54	.49	1.33
62 (Effective Lab. Use)	.45	.38	1.09
63 (Add. Lab. Space)	.25	.09	1.50
64 (Add. Lab. Equip.)	.32	.17	1.22

* No C/B value indicates that the B-value was zero.

TABLE G 10

Distributions of Responses to Section IV Items
for the General Science Group of the Census

Item	A	C	C/B
42 (Indv.)	.64	.39	1.00
43 (Slow)	.53	.24	.80
44 (Able)	.45	.40	1.12
45 (Induct.)	.62	.52	1.02
46 (Active Invol.)	.69	.56	1.04
47 (Motivate)	.57	.30	.86
48 (Non-college)	.31	.15	.79
49 (Self-paced)	.39	.24	.96
50 (Computers)	.09	.05	.71
51 (Comp. Asst. Inst.)	.07	.04	.75
52 (Up-date)	.58	.55	1.02
53 (Curr. Dev.)	.45	.43	.94
54 (Interdiscp.)	.30	.17	1.01
55 (Fusing)	.39	.30	1.09
56 (In-depth)	.43	.39	.96
57 (Refresh.)	.51	.51	1.09
58 (Allied Subs.)	.45	.45	1.09
59 (Local)	.24	.11	.91
60 (Research)	.27	.25	.96
61 (Outside Resources)	.32	.26	1.31
62 (Effective Lab. Use)	.48	.41	1.09
63 (Add. Lab. Space)	.32	.14	1.21
64 (Add. Lab. Equip.)	.38	.21	1.22

TABLE G 11

Distributions of Responses to Section IV Items
for the Psychology Group of the Census

Item	A	C	C/B*
42 (Indv.)	.70	.50	1.14
43 (Slow)	.36	.17	.92
44 (Able)	.52	.47	1.48
45 (Induct.)	.62	.50	1.22
46 (Active Invol.)	.76	.67	1.05
47 (Motivate)	.50	.39	.93
48 (Non-college)	.24	.09	.75
49 (Self-paced)	.41	.11	.54
50 (Computers)	.11	.03	
51 (Comp. Asst. Inst.)	.12	.05	
52 (Up-date)	.68	.68	1.05
53 (Curr. Dev.)	.50	.41	1.08
54 (Interdiscp.)	.38	.24	.89
55 (Fusing)	.20	.15	1.00
56 (In-depth)	.47	.35	.92
57 (Refresh.)	.56	.47	1.00
58 (Allied Subs.)	.39	.52	1.42
59 (Local)	.24	.09	1.00
60 (Research)	.52	.50	1.06
61 (Outside Resources)	.38	.26	1.00
62 (Effective Lab. Use)	.47	.35	1.15
63 (Add. Lab. Space)	.36	.18	.86
64 (Add. Lab. Equip.)	.45	.24	.89

* No C/B value indicates that the B-value was zero.

TABLE G 12

Distributions of Responses to Section IV Items
for the Economics Group of the Census

Item	A	C	C/B
42 (Indv.)	.61	.30	.82
43 (Slow)	.45	.14	.76
44 (Able)	.52	.44	1.08
45 (Induct.)	.61	.37	.77
46 (Active Invol.)	.72	.48	.88
47 (Motivate)	.53	.18	.78
48 (Non-college)	.31	.11	.66
49 (Self-paced)	.33	.11	.61
50 (Computers)	.09	.04	.64
51 (Comp. Asst. Inst.)	.09	.06	1.33
52 (Up-date)	.69	.65	.99
53 (Curr. Dev.)	.48	.39	.88
54 (Interdiscp.)	.29	.14	.79
55 (Fusing)	.05	.05	1.00
56 (In-depth)	.40	.41	1.02
57 (Refresh.)	.55	.56	1.00
58 (Allied Subs.)	.51	.46	1.05
59 (Local)	.22	.10	.76
60 (Research)	.23	.20	.96
61 (Outside Resources)	.45	.35	1.06
62 (Effective Lab. Use)	.16	.06	.82
63 (Add. Lab. Space)	.07	.02	.83
64 (Add. Lab. Equip.)	.10	.04	1.60

TABLE G 13

Distributions of Responses to Section IV Items
for the Sociology Group of the Census

Item	A	C	C/B
42 (Indv.)	.71	.38	.84
43 (Slow)	.47	.22	.91
44 (Able)	.43	.38	1.33
45 (Induct.)	.75	.69	1.00
46 (Active Invol.)	.74	.63	.93
47 (Motivate)	.60	.31	.74
48 (Non-college)	.33	.18	.94
49 (Self-paced)	.35	.15	.68
50 (Computers)	.07	.04	2.00
51 (Comp. Asst. Inst.)	.06	.04	1.60
52 (Up-date)	.61	.66	1.09
53 (Curr. Dev.)	.55	.60	1.10
54 (Interdiscp.)	.31	.27	1.26
55 (Fusing)	.08	.06	1.43
56 (In-depth)	.41	.38	.99
57 (Refresh.)	.44	.45	1.07
58 (Allied Subs.)	.65	.58	1.04
59 (Local)	.27	.20	1.06
60 (Research)	.37	.35	1.15
61 (Outside Resources)	.48	.39	1.11
62 (Effective Lab. Use)	.19	.13	.96
63 (Add. Lab. Space)	.08	.04	.88
64 (Add. Lab. Equip.)	.12	.06	.83

TABLE G 14

Distributions of Responses to Section IV Items
for the Engineering Concepts Curriculum Project (ECCP) Group of the Census

Item	A	C	C/B
42 (Indv.)	.66	.32	.97
43 (Slow)	.39	.21	.80
44 (Able)	.58	.38	1.10
45 (Induct.)	.56	.39	1.21
46 (Active Invol.)	.72	.47	1.03
47 (Motivate)	.54	.31	.90
48 (Non-college)	.47	.34	.75
49 (Self-paced)	.36	.21	1.39
50 (Computers)	.50	.62	1.09
51 (Comp. Asst. Inst.)	.38	.36	1.14
52 (Up-date)	.56	.50	1.09
53 (Curr. Dev.)	.51	.52	1.11
54 (Interdiscp.)	.49	.47	1.12
55 (Fusing)	.44	.36	1.02
56 (In-depth)	.32	.21	1.04
57 (Refresh.)	.39	.21	1.14
58 (Allied Subs.)	.44	.42	1.00
59 (Local)	.27	.15	1.06
60 (Research)	.27	.14	.73
61 (Outside Resources)	.37	.23	1.29
62 (Effective Lab. Use)	.38	.21	.86
63 (Add. Lab. Space)	.27	.10	.80
64 (Add. Lab. Equip.)	.39	.24	1.22

TABLE G 15

Distributions of Responses to Section IV Items
for the Earth Sciences Curriculum Project (ESCP) Group of the Census

Item	A	C	C/B
42 (Indv.)	.68	.42	1.00
43 (Slow)	.54	.19	.73
44 (Able)	.49	.36	1.08
45 (Induct.)	.69	.67	1.07
46 (Active Invol.)	.71	.63	1.01
47 (Motivate)	.65	.28	.76
48 (Non-college)	.32	.12	.84
49 (Self-paced)	.38	.16	.79
50 (Computers)	.07	.01	.40
51 (Comp. Asst. Inst.)	.07	.03	.80
52 (Up-date)	.65	.65	.99
53 (Curr. Dev.)	.46	.49	1.05
54 (Interdiscp.)	.33	.16	.83
55 (Fusing)	.34	.18	1.02
56 (In-depth)	.50	.48	.98
57 (Refresh.)	.52	.50	1.05
58 (Allied Subs.)	.52	.52	1.01
59 (Local)	.28	.18	1.04
60 (Research)	.30	.30	.89
61 (Outside Resources)	.51	.48	1.14
62 (Effective Lab. Use)	.55	.40	.98
63 (Add. Lab. Space)	.34	.14	.98
64 (Add. Lab. Equip.)	.43	.28	1.29

TABLE G 16

Distributions of Responses to Section IV Items
for the Intermediate Science Curriculum Study (ISCS) Group of the Census

Item	A	C	C/B*
42 (Indv.)	.87	.82	.98
43 (Slow)	.58	.52	.98
44 (Able)	.47	.46	1.00
45 (Induct.)	.72	.72	1.08
46 (Active Invol.)	.81	.84	1.14
47 (Motivate)	.59	.46	.86
48 (Non-college)	.23	.15	1.20
49 (Self-paced)	.76	.80	1.03
50 (Computers)	.06	.00	
51 (Comp. Asst. Inst.)	.08	.03	1.00
52 (Up-date)	.44	.39	1.11
53 (Curr. Dev.)	.47	.56	1.16
54 (Interdiscp.)	.28	.14	.85
55 (Fusing)	.34	.22	1.06
56 (In-depth)	.23	.15	.80
57 (Refresh.)	.39	.39	1.19
58 (Allied Subs.)	.32	.27	1.50
59 (Local)	.15	.10	1.33
60 (Research)	.16	.10	1.00
61 (Outside Resources)	.23	.14	1.10
62 (Effective Lab. Use)	.47	.46	1.16
63 (Add. Lab. Space)	.19	.14	1.83
64 (Add. Lab. Equip.)	.33	.30	1.41

* No C/B value indicates that the B-value was zero.

TABLE G 17

Distributions of Responses to Section IV Items
for the Introductory Physical Science (IPS) Group of the Census

Item	A	C	C/B
42 (Indv.)	.62	.43	1.05
43 (Slow)	.55	.30	.84
44 (Able)	.46	.47	1.24
45 (Induct.)	.68	.69	1.15
46 (Active Invol.)	.75	.71	1.08
47 (Motivate)	.57	.38	.86
48 (Non-college)	.37	.23	.94
49 (Self-paced)	.38	.23	1.02
50 (Computers)	.07	.01	.18
51 (Comp. Asst. Inst.)	.07	.02	.40
52 (Up-date)	.54	.44	1.00
53 (Curr. Dev.)	.53	.49	.94
54 (Interdiscp.)	.33	.17	1.02
55 (Fusing)	.47	.33	1.15
56 (In-depth)	.32	.23	.89
57 (Refresh.)	.48	.43	1.02
58 (Allied Subs.)	.40	.39	1.07
59 (Local)	.23	.12	.78
60 (Research)	.25	.19	.98
61 (Outside Resources)	.29	.18	1.39
62 (Effective Lab. Use)	.52	.48	1.18
63 (Add. Lab. Space)	.39	.19	1.02
64 (Add. Lab. Equip.)	.42	.27	1.21

TABLE G 18

Distributions of Responses to Section IV Items
for the Harvard Physics Project (HPP) Group of the Census

Item	A	C	C/B
42 (Indv.)	.77	.63	1.14
43 (Slow)	.43	.32	1.02
44 (Able)	.54	.36	.87
45 (Induct.)	.57	.40	1.01
46 (Active Invol.)	.77	.70	1.02
47 (Motivate)	.57	.37	.89
48 (Non-college)	.41	.27	.97
49 (Self-paced)	.47	.36	1.02
50 (Computers)	.13	.04	1.27
51 (Comp. Asst. Inst.)	.11	.04	1.60
52 (Up-date)	.61	.49	.98
53 (Curr. Dev.)	.58	.64	1.08
54 (Interdiscp.)	.52	.48	1.13
55 (Fusing)	.35	.17	1.09
56 (In-depth)	.41	.26	.99
57 (Refresh.)	.50	.45	1.05
58 (Allied Subs.)	.45	.32	1.03
59 (Local)	.20	.11	.93
60 (Research)	.18	.08	.78
61 (Outside Resources)	.30	.18	1.22
62 (Effective Lab. Use)	.57	.44	1.01
63 (Add. Lab. Space)	.29	.14	1.08
64 (Add. Lab. Equip.)	.51	.36	1.17

TABLE G 20

Distributions of Responses to Section IV Items for the Sociological Resources for Secondary Schools (SRSS) Group of the Census

Item	A	C	C/B*
42 (Indv.)	.69	.37	.81
43 (Slow)	.49	.26	.94
44 (Able)	.45	.42	1.43
45 (Induct.)	.77	.70	1.04
46 (Active Invol.)	.74	.62	.91
47 (Motivate)	.64	.34	.72
48 (Non-college)	.33	.17	.91
49 (Self-paced)	.34	.15	.75
50 (Computers)	.04	.03	
51 (Comp. Asst. Inst.)	.04	.03	1.33
52 (Up-date)	.60	.66	1.13
53 (Curr. Dev.)	.54	.54	1.10
54 (Interdiscp.)	.31	.27	1.23
55 (Fusing)	.07	.05	1.20
56 (In-depth)	.43	.38	1.05
57 (Refresh.)	.50	.47	1.08
58 (Allied Subs.)	.63	.50	1.00
59 (Local)	.29	.18	.96
60 (Research)	.39	.33	1.18
61 (Outside Resources)	.50	.39	1.18
62 (Effective Lab. Use)	.19	.11	1.00
63 (Add. Lab. Space)	.08	.01	.25
64 (Add. Lab. Equip.)	.12	.05	1.00

* No C/B value indicates that the B-value was zero.

TABLE G 19

Distributions of Responses to Section IV Items for the University of Illinois Committee on School Mathematics (UICSM) Group of the Census

Item	A	C	C/B
42 (Indv.)	.67	.30	.89
43 (Slow)	.69	.44	.89
44 (Able)	.51	.39	1.07
45 (Induct.)	.64	.50	.95
46 (Active Invol.)	.73	.54	.91
47 (Motivate)	.69	.40	.87
48 (Non-college)	.38	.13	.84
49 (Self-paced)	.44	.18	.77
50 (Computers)	.16	.03	.69
51 (Comp. Asst. Inst.)	.14	.03	.90
52 (Up-date)	.54	.41	.98
53 (Curr. Dev.)	.49	.46	1.04
54 (Interdiscp.)	.18	.05	.79
55 (Fusing)	.22	.03	.52
56 (In-depth)	.37	.25	.96
57 (Refresh.)	.45	.34	.97
58 (Allied Subs.)	.29	.15	.72
59 (Local)	.24	.14	1.10
60 (Research)	.14	.05	.81
61 (Outside Resources)	.25	.05	.71
62 (Effective Lab. Use)	.19	.05	.63
63 (Add. Lab. Space)	.18	.03	.79
64 (Add. Lab. Equip.)	.19	.05	.94

APPENDIX H

Distributions of Responses to Section V Items for the Disciplines of the Sample and for the Disciplines and Implementation Groups of the Census

TABLE H 1

Distributions of Responses to Section V Items for the Disciplines of the Sample

Group	Scores	
	Feeling Tone	Action
Biology	41.32	39.55
Chemistry	40.51	37.10
Earth Science	40.05	38.27
General Science	40.21	36.52
Mathematics	39.78	32.80
Physics	40.55	37.74
Multiple Fields	40.70	36.55

TABLE H 2

Distributions of Responses to Section V Items for the Disciplines of the Census

Group	Scores	
	Feeling Tone	Action
Earth Science	43.13	41.86
Geography	41.85	40.28
General Science	42.36	40.15
Psychology	40.87	40.48
Economics	37.63	34.46
Sociology	33.89	35.31

TABLE H 3

Distributions of Responses to Section V
Items for the Implementation Groups of the Census

Group	Scores	
	Feeling Tone	Action
Engineering Concepts Curriculum Project (ECCP)	39.24	37.38
Earth Science Curriculum (ESCP)	44.04	43.66
Intermediate Science Curriculum Study (ISCS)	43.29	40.59
Introductory Physical Science (IPS)	43.46	41.87
Harvard Physics Project (HPP)	42.06	41.19
University of Illinois Committee on School Mathematics (UICSM)	39.75	34.42
Sociology Resources for the Social Studies (SRSS)	33.73	34.78